

#### 4. Environmental Consequences

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Fire Management  
Amendment  
Environmental  
Assessment

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## CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES

This section is an analysis of the environmental consequences of the project alternatives, including the anticipated cumulative and residual impacts. The analyses presented herein are landscape level, large-scale analyses of the four alternative approaches to fire management as described in Chapter 2, and the effect that managing fire under those alternatives would have on the 7.5 million acres of public lands within the Elko District. Environmental consequences may also be addressed in subsequent site specific EA's or are described in other guiding documents outlined in Chapter 2.

A determination of the environmental consequences is difficult because fire is a natural part of the ecosystem. Accurate projections of number of acres impacted by wildfire or related activities within the District's 7.5 million acres of public land are also difficult due to the number of variables present. In order to assist in the evaluation of environmental consequences, a general estimate of impacted area for each alternative over time has been provided in Table 2F-1. Additionally, Table 2F-2 summarizes anticipated impacts related to each environmental element considered.

The emphasis on suppressing fires over the past century has altered natural fire cycles. This has resulted in unnatural fuel loads in vast areas. The buildup of fuels in turn has increased the risk and extent of fire, and the cost of extinguishing fires. Due to the extent that the native landscape has been altered and the need to protect land uses and ensure human health and safety, the return of natural fire cycles cannot be expected. As shown in Table 2F-1, both the Limited and Full Suppression alternatives run the risk of increasing the size and severity of wildfire. However, because the Proposed Action is an integrated approach to fire prevention, response (suppression) and rehabilitation, it is anticipated that long-term management of fire can be improved, resulting in positive effects on the issues addressed in this section. In addition to the guidance outlined in this document, site-specific analyses of activity plans for specific fire prevention, response and rehabilitation efforts would occur in compliance with NEPA. All future actions would also need to comply with existing SOPs, which would minimize the potential effects on the issues analyzed below.

The environmental consequences, including the cumulative impacts presented below, are based on the following assumptions:

1. The population growth of the area will remain relatively constant.
2. The climate will remain constant.
3. The timeframes examined in the cumulative impacts sections are limited to a 20 to 40-year ecological time frame.
4. Land ownership and land use patterns will remain relatively constant.
5. Funding would remain the same or increase.

### A. Air Quality

#### 1. No Action Alternative

The low level of prescribed burning or managed fire use in the Elko District would lead to further accumulation of fuels, increasing the number and extent of severe fires, particularly during July and August. In general, air pollution from large wildfire is greater



than smaller prescribed fire. This would lead to increased air quality problems during these months, as the total smoke emissions in the District would increase.

**Cumulative Impacts** – The amount of smoke produced by wildfire exceeds that of prescribed fire on a per-acre basis. This could lead to greater degradation of air quality during the limited active fire season (July-September). The resulting long-term cumulative impact could be that of increasing total smoke emissions, which would impact sensitive receptors to a greater extent.

## **2. Full Suppression Alternative**

The emphasis on suppression under the Full Suppression alternative would increase the accumulation of fuels, thereby further increasing the number and extent of severe fires as compared to the Proposed Action alternative. This would further increase the air quality problems in the District, particularly during July and August when the risk of fire is greatest. The potential for degradation of air quality due to smoke would exist at the burn site for a greater period of time. The total smoke emissions would also increase under the Full Suppression alternative.

**Cumulative Impacts** – The cumulative impacts would be similar to those noted for the No Action alternative.

## **3. Limited Suppression Alternative**

Initially, the extent of wildfires would increase due to the minimized fire suppression efforts. This would lead to an immediate increase in the annual total smoke emissions for the District. The benefit to sensitive receptors from fire suppression actions would also be diminished under this alternative.

**Cumulative Impacts** – The cumulative impacts would be similar to those noted for the No Action alternative.

## **4. Proposed Action**

Initially, air quality degradation within the area of a prescribed fire or where wildland fire is managed could occur. In the brush and grass vegetation types, however, smoke would dissipate rapidly and should be gone by the next day. In the pinyon-juniper and mixed conifer types, there would be some residual smoke for several days after the fire. One of the goals of fire prevention is to reduce the amount of fuel present and reduce the potential for future lethal fires. Using prescribed fire in sagebrush/grass vegetation communities could have a similar effect by increasing the percentage of grasses and reducing the heavier sagebrush fuels. Prescribed burning generates approximately 70 to 75 percent of the PM<sub>10</sub> emissions per acre that a wildfire does. Fire intensity and season will influence resulting air quality conditions of any prescribed burn or wildfire. While prescribed fire would result in temporary negative impacts on air quality, acute impacts to air quality from wildfire should decrease under the Proposed Action.

The Nevada Division of Environmental Protection oversees a permit application and approval procedure for fire use that is designed to minimize air quality impacts. The process is required of all land managers involved in the use of fire. The permits that are issued describe the smoke management and emission reduction techniques to be used.



While permits are issued well in advance of burns, approval is not granted until the day before the burn in order to ensure that meteorological and air quality conditions are satisfactory for the burn. Under the Proposed Action, the BLM would continue to apply for and obtain burn permits prior to igniting any prescribed fire or using wildland fire in an area. The consideration and evaluation of alternatives to burning (e.g., other fuel reduction methods, including mechanical and chemical methods) that could meet the management objectives for the site would also be reviewed as part of the permit process.

Unforeseen weather changes may cause smoke to impact sensitive receptors. Sensitive receptors, i.e., urban and rural population centers, schools, recreational and scenic view areas, and the Jarbidge Wilderness area in northern Elko County (the only Class I area in Nevada), are not expected to be negatively affected from fire due to the requirements set forth in the burn permits and monitoring that would occur during fire use. For large fires that are expected to last more than one day, air quality monitoring (including the use of real-time particulate matter monitors or other measures as required by the Nevada Division of Environmental Protection) would ensure that sensitive receptors are not adversely affected by the burn.

Because wildfire is a natural part of the vegetation communities within the Great Basin, the effects of smoke on air quality from natural fire can be considered a part of pre-existing air quality conditions, while air quality impacts from prescribed burns are minimized through a permit application process. An integrated approach to fire management would reduce heavy fuel loads and create a mosaic of fuels; both of these effects would lessen the occurrence and extent of severe fire. Over a period of 20 to 40 years, this would reduce total smoke emissions throughout the District.

**Cumulative Impacts** –Some research shows a long-term decrease in emissions if prescribed fire or wildland fire is used. It is not possible to accurately predict the cumulative impacts at this analysis level, and any prediction of cumulative impacts at a site-specific level would not be reliable. Public and private lands are experiencing an increase in prescribed burning. The increase in prescribed fire acreage may lead to higher smoke impacts on sensitive receptors. The cumulative impact of multiple prescribed burning projects should be assessed at the site-level before projects are undertaken. The beneficial effects of reduced fuel loads, a vegetative mosaic, and the resulting decrease in fire size are expected to minimize the potential for smoke impacts on sensitive receptors.

## **B. Native American Consultation/Religious Concerns**

Various tribes and bands of the Western Shoshone have stated that federal projects and land actions can have widespread effects to their culture and religion as they consider the landscape as sacred and as a provider.

Due to the fact that there is limited knowledge of religious or important cultural sites in the area, there exists the possibility of land management practices to adversely affect traditional life ways and the integrity of Native American religious sites or sites of cultural importance.

As stated in Chapter 3, consultation will remain ongoing for this particular action due to the sensitivity and sacred nature of Native American religious activities, ceremonies, and



religious site locations. Traditional practitioners are often reluctant to release sacred or religious information until there exists a direct and immediate threat to an area of cultural significance. Therefore, efforts must still be made in improving the communication and working relationship between the BLM and tribal governments and communities in order to successfully solicit comments and gather information concerning areas of religious, traditional, or cultural importance.

### **1. No Action Alternative**

Due to the emphasis on fire suppression, the initial risk from fire to areas of traditional or religious importance would be reduced. However, with the increased fuel load that is expected under the No Action alternative would lead to larger, severe fires. Such fires are difficult to suppress; therefore, the risk to sites of cultural and religious value to Native Americans would increase.

**Cumulative Impacts** – The buildup of fuels would lead to more intense fires, which would impact religious sites on a larger scale than present.

### **2. Full Suppression Alternative**

The impacts noted for the No Action alternative would apply to the Full Suppression alternative. However, due to the greater emphasis placed on fire suppression, the risk to sites of cultural and religious value to Native Americans would be greater.

**Cumulative Impacts** – The cumulative impacts would be similar to those noted for the No Action alternative.

### **3. Limited Suppression Alternative**

The low emphasis placed on fire prevention and suppression under the Limited Suppression alternative would lead to the greatest impacts to sites of cultural and religious value to Native Americans. The damage to artifacts, burning of important plant species or changes to the religious ambience of a site would be highest under this low management method. Although the effects from grading, bulldozing and other suppression methods would decrease, the occurrence of wildfire and its effects on native plant communities and the resources associated with native habitats would increase.

**Cumulative Impacts** – The cumulative impacts would be similar to those noted for the No Action alternative.

### **4. Proposed Action**

Methods of fire prevention, response or rehabilitation that may be used under the Proposed Action would adhere to SOPs (Appendix 2), FMC and polygon guidance (refer to Chapter 2), and direction provided by guiding documents regarding areas of Native American significance. In some cases, such as prescribed burning, an activity report would be prepared that would address the management objectives and site-specific concerns. In addition, public and agency input would be obtained, required surveys would be conducted, and federal laws and regulations regarding historic properties and archaeological resources would be upheld, including preparation of documentation as



required under NEPA and NHPA when applicable. Therefore, for the known areas of traditional or religious significance within the District, the potential for impacts to these sites is expected to be low.

However, if unknown sites are present in an area where fire management activities are conducted or fires occur, there may be negative impacts to the resource. This could include damage to artifacts, burning important plant species, or changing the religious ambience of the site. Because prescribed burns and the management of unplanned ignitions would only occur if the fuel loads, moisture content, wind speed and other factors were appropriate for the site, the risk of unplanned fire in areas important to Native Americans would be low. Additionally, strategically placed green stripping may aid in the protection of resources of concern to Native Americans.

**Cumulative Impacts** – Some of the known traditional cultural properties and sacred areas occur along or near riparian systems. The management objectives for wetlands and riparian zones would cumulatively benefit cultural properties in such areas. No other cumulative impacts are expected.

## **C. Cultural Resources**

### **1. No Action Alternative**

A lesser emphasis on fire prevention activities than the Proposed Action would allow fuels to accumulate leading to larger and hotter fires. Because most damage to cultural resources occurs from higher intensity fires, the effect on these resources under the No Action alternative would be expected to be greater. Due to the minimal efforts placed on preventing fire, a greater need for fire suppression measures would also be expected. The potential for direct impacts from bulldozing, vehicle tracks and disturbance from suppression equipment, which could potentially include damaging or destroying cultural resource sites thus reducing their integrity and research value, would increase under this alternative.

**Cumulative Impacts** – The cumulative impacts could include loss and damage of undocumented and documented sites as wildfire acres and severity increase.

### **2. Full Suppression Alternative**

Under the Full Suppression alternative, there would be the greatest buildup of fuels. Due to the minimal efforts placed on fire prevention and a focus on Full Suppression of all fires, impacts would be expected to exceed that of the No Action alternative. Therefore, the potential for direct impacts from bulldozing, vehicle tracks and disturbance from suppression equipment would be greatest under this alternative.

**Cumulative Impacts** – The chances of a severe wildfire would increase beyond that noted for the No Action Alternative, increasing the occurrence of hotter fires. This could lead to greater loss and damage of undocumented and documented sites as wildfire acres and severity increase.



### 3. Limited Suppression Alternative

Under the Limited Suppression alternative, there is not expected to be a continued fuel buildup. With minimal effort on fire prevention and suppression, unmanaged fires burning under dry and hot conditions would be expected. The potential for impacts to cultural resources would be high.

**Cumulative Impacts** – The occurrence of hot fires would be similar to that expected under the No Action and Full Suppression alternatives. Therefore, the cumulative impacts could include the loss and damage of undocumented and documented sites as wildfire acres and severity increase.

### 4. Proposed Action

The effects of fire on cultural resources are highly variable. Many factors, including the types of cultural resources, fire history, vegetation types, fire intensity, duration of high heat, soil types, topography, suppression/containment methods used, etc. must be considered. Some impacts are direct others are indirect. Among the direct impacts are those caused to sites containing perishable items. Buildings, other structures, features and artifacts made of organic materials such as wood, shell, bone, antler, horn, plant fiber, hide and cloth are highly susceptible to fire and can be destroyed or severely damaged by both wild and prescribed fires.

Flaked stone tools are less susceptible to fire effects, but still can be altered or even destroyed by range and forest fires. Impacts include smudging, cracking, breaking, spalling, shattering and oxidizing. The intensity and duration of the heat is the most important factor. The minimum temperature needed to cause changes to flaked stone artifacts depends on the chemical and physical characteristics of the rock. Laboratory experiments indicate that some crystalline structure of silica-rich stone can be altered or the stone broken at temperatures above 370°C (Hanes 1994:VIII-2). Others require temperatures in excess of 500°C. Post-fire field observations in several areas including the Elko District confirm damage to chert artifacts from high intensity burning. The percentage of fire-damaged flaked stone artifacts observed in the Elko District is low. Many of the observed burned sites contained no damaged artifacts. Others contain a few damaged artifacts, usually in locations where fuel was heavy and the heat very high.

Larger stone artifacts and rocks appear to be relatively unaffected by all but the most intense fires. Smudging occurs, but breakage is uncommon. One concern that has been raised is the possibility that burned native rocks would be indistinguishable from rocks used for cooking and heating by prehistoric people (Conner et al. 1989). Field observations in the Elko District indicate that range fires seldom fracture stones found on the ground surface. When breakage does occur it is usually confined to removing a spall or spalls from an exposed edge. Non-human heat-spalled rocks are seldom found on flat ground, instead they are found on slopes where the intensity of the heat at the ground surface is greatly increased due to the flame edge moving up a steep angle of repose. Extensive fracturing, as found with cooking/heating stones, has not been observed, except among welded tuff obsidian cobbles and one porous rhyolitic rock type, both found in O'Neil Basin.

Pottery may be seriously affected by fire by affecting their chemical composition, changing their colors, and altering or removing their decorative paints. Substantial



changes occur at temperatures of 495°C and above (Hanes 1994:VIII-3). Rock art sites are susceptible to damage by fire. Painted elements (pictographs) can be soot blackened, scorched or completely burned away, while pecked elements (petroglyphs) on friable stone such as sandstone and limestone can exfoliate. Rock art is often located on vertical faces of boulders or cliff faces where heat intensity is greater than found near the ground surface. Another resource found in cliffs and caves is wood rat middens, the accumulated plant remains and other debris cemented by wood rat urine that are used for paleoenvironmental studies. One midden in the Elko District dates to 50,000 years B.P. Wood rat middens can be essential for reconstructing past environments and are very susceptible to burning.

Fire impacts can also affect the ability of archaeologists to date prehistoric sites. This includes contamination of radiocarbon samples with modern ash and charcoal and physically or chemically altering datable materials. Thermoluminescence dating of pottery and rock requires measuring the minute amounts of light accumulated in the matrix of rocks and pottery due to the decay of radioactive material since the material was last heated. Exposure to high heat, such as a wildland fire, will reduce or eliminate the light and provide dates that are inaccurate. Obsidian hydration is a dating technique that measures the amount of moisture absorbed by obsidian artifacts. The moisture accumulates at a steady rate and forms a microscopic band on the surface of the artifact. By measuring the thickness of the band, the age of the artifact can be estimated. Exposure to high heat can alter or destroy the hydration band. Archaeomagnetic dating measures the orientation of electrons in clay of prehistoric hearths. The electrons in unheated clay align with the North Pole but are frozen in place by heating. Dates are obtained by comparing the orientation data with tables showing the location of the North Pole as it has shifted over time. If hearths are exposed to temperatures exceeding 524°C the electrons will realign with the current magnetic field erasing the record of its prehistoric use (Hanes 1994:VIII-4).

Wildfire caused either by natural causes or by native peoples has been a major element in development of the ecosystems in the western United States. Before intensive suppression began in the mid 1900s in northeast Nevada, wildfires were common. Estimates place the interval between fires for any given area in the sagebrush vegetation communities of between 11 to 100 years, and for pinyon-juniper an interval of 10-30 years with severe crown fires every 200-300 years. No studies have been made to quantify the fire history of this area or to determine the impacts to cultural resources, but there is evidence to support the concept of repeated wildfires in northeast Nevada. It is not uncommon to find thin lines of charcoal exposed in arroyo cuts, marking episodes of prehistoric burning. Often more than one episode is visible in the exposure. In the pinyon-juniper forests and current brush lands, ancient burned-out stumps can sometimes be found among mature stands of trees or sagebrush. Thermal damage to artifacts in archaeological sites often equates to prior burning of those cultural properties. Artifacts exhibiting crazing or pot lid scars, although not abundant, are routinely encountered in archaeological sites. Intentional heat treatment may account for some of this damage, but wildland fire is probably the more common cause.

Because fire was a major component of the ecosystem, few cultural resources over 150 years of age would have escaped burning. Most sites would have burned multiple times. However, with the increase in fuel loads resulting from fire suppression activities in recent times, the occurrence of severe wildfires has increased and the most damage to cultural resources occurs from higher intensity fires. The longer high heat is in contact



with artifacts and features, the greater the damage. Fire prevention methods, including prescribed fire, reduce fuel loads and minimize the likelihood of wildfires and the extent of those that occur. Prescribed fires generally burn under conditions that result in cooler fires. The reduction in the size of wildfires and the temperature at which fire would burn would minimize the potential for effects on cultural resources.

Often, the factor with the greatest potential for major impact is the fire team and the equipment used to implement the burn project or to suppress wildfires. Fire retardant chemicals may contaminate artifacts and features. Ground-disturbing activities, such as grading, bulldozing, fire line construction, vehicle use, mechanical brush clearing and hand line construction can damage or destroy cultural resources. Ordinarily, with the most common exception being the presence of perishable materials and structures, it is less damaging to allow fire burn over a site rather than use equipment within it.

Indirect fire effects and fire suppression effects include increased erosion of sites, and the potential for site destruction and illegal artifact removal by artifact collectors and fire crews due to the enhanced visibility of cultural resources.

Methods of fire prevention, response or rehabilitation that may be used under the Proposed Action would adhere to SOPs, FMC, and direction provided from other guiding documents regarding cultural resources. In some cases, such as prescribed burning, an activity report would be prepared that would address management objectives and site-specific concerns, public and agency input would be obtained, surveys as required would be conducted, and federal laws and regulations regarding historic properties and archaeological resources would be upheld, including preparation of documentation as required under NEPA and the National Historic Preservation Act. Measures would also be implemented to increase protection of cultural resources after they have been exposed by fire. The Proposed Action FMCs and polygon descriptions (A2) outlined in Chapter 2 provide additional direction aimed at the protection of sensitive resources identified on the Cultural Fire Alert Map. In light of the measures that would be implemented, as well as the reduction of fire size and intensity, that would be expected, the net effect of the Proposed Action would be a decrease in impacts to cultural resources.

**Cumulative Impacts** – As part of the proposed activity surveys for cultural resources may be required. Because of this, there would be a greater amount of inventory done within the Elko District, increasing the knowledge base of types and locations of cultural resources. To protect known cultural resources that may be adversely affected by any fire, herbicides may be used to reduce fuel loads. The use of chemical treatments, where such methods would avoid destruction of the cultural resource, may lead to effects to sensitive wildlife depending on the habitat at the site. Furthermore, herbicide use may be a concern to Native Americans using traditional plant gathering areas. These cumulative impacts would be minimized by the preparation of pre-activity reports, which would address site-specific issues of concern for the site.



## **D. Paleontology**

### **1. No Action Alternative**

Increased fire intensity due to limited reduction in fuels with the No Action alternative may increase the chances of high intensity fires that could potentially impact important fossils.

**Cumulative Impacts** - No cumulative impacts are expected for a No Action alternative.

### **2. Full Suppression Alternative**

The Full Suppression alternative would not likely impact paleontology resources.

**Cumulative Impacts** - No cumulative impacts are expected for a Full Suppression alternative.

### **3. Limited Suppression Alternative**

Increased fire intensity due to limited reduction in fuels and limited fire suppression may increase the chances of high intensity fires that could potentially impact important fossils.

**Cumulative Impacts** - No cumulative impacts are expected for this alternative.

### **4. Proposed Action**

The effects of fire on paleontological resources are generally considered to be minimal. Some factors, such as, vegetation types, fire intensity, and duration of high heat may affect some fossils close to the surface. Impacts would not likely be significant. Generally fire increases opportunity for paleontologists to discover new fossils.

**Cumulative Impacts** - No cumulative impacts are expected for the Proposed Action.

## **E. Lands**

### **1. No Action Alternative**

There would be fewer options for the BLM to work cooperatively on fire prevention projects with private landowners to reduce fuel hazards or to improve vegetative conditions. Continued fuel buildup could lead to more severe fires, which would escape initial attack and threaten private lands, rights-of-way and other land uses.

**Cumulative Impacts** – The risk to private lands from larger fires would likely increase due to the heavy fuel buildup on and adjacent to public lands.

### **2. Full Suppression Alternative**

Similar to the No Action alternative, the Full Suppression alternative would allow few options for the BLM to cooperatively work on fire prevention projects with private landowners to reduce fuel hazards or to improve vegetative conditions. Due to the



emphasis on suppression of fires, the fuel buildup is expected to exceed that of other alternatives, which would lead to the most severe fires with an increased risk to private lands, rights-of-way and other land uses. Severe fires would increase the impact on land uses, including the potential closure time of various allotments. Without a more targeted approach to fire management, large and more severe fires would have an effect on erosion and increase the establishment of invasive weed species.

**Cumulative Impacts** – The risk to private lands from uncontrolled fire would likely occur sooner due to the heavy fuel buildup on and adjacent to public lands from the emphasis of Full Suppression of all fires. The negative effect on private lands following wildfire could be compounded if adjacent public lands experience erosion impacts due to complex rehabilitation efforts.

### 3. Limited Suppression Alternative

Similar to the Full Suppression alternative, the Limited Suppression alternative would allow few options for the BLM to cooperatively work on fire prevention and post-fire rehabilitation projects with private landowners to reduce fuel hazards, improve vegetative conditions, or increase the likelihood of post-burn vegetative recovery. With minimal effort placed on the suppression of fires at the urban interface, there would be an immediate increased risk to private lands, rights-of-way and other land uses.

**Cumulative Impacts** – The risk to private lands from the escape of fire would occur sooner than under other alternatives due to unsuppressed fires. With minimal effort placed on fire management throughout the District, the threat to private lands, rights-of-way and other land uses would increase each year.

### 4. Proposed Action

Heavy fuel accumulations on public lands would be targeted and reduced (using prescribed fire) in accordance with the management objectives appropriate for the site. The ongoing managed reduction in fuel loads throughout public lands, habitat benefits from these activities, and appropriate use of rehabilitation measures would in turn reduce the possibility of wildfire negatively impacting private lands. Opportunities would be increased for private landowners and the BLM to cooperate on fire prevention projects that would benefit the vegetation and uses on adjoining lands. The area of urban interface is growing throughout the District. The protection of the urban interface through the use of fire prevention methods to reduce fuel hazards, and through appropriate post-fire rehabilitation measures would be beneficial to the communities involved. The authorized land uses within the Elko Field Office would not be affected.

The Proposed Action FMC's and polygon descriptions outlined in Chapter 2 provide additional direction aimed at the protection of resources. The polygons described the appropriate response to fire in different areas, protecting life and property and maximizing resource values.

**Cumulative Impacts** – Cumulative impacts are anticipated to include greater public and private sector interaction on projects to reduce fire hazards at the urban interface and increase productiveness of adjoining lands.



## F. Water Resources

### 1. No Action Alternative

Continued buildup of fuels could lead to hotter and more extensive fires, causing greater loss of vegetation and a decreased likelihood for the recovery of vegetation appropriate for the site. This could lead to greater peak and total stream discharges, a possible increase in stream temperatures, and an increase in nutrient and sediment loading.

Very high peak flows and associated mud or debris flows following a short duration high intensity storm event will increase in frequency as fires increase. High runoff events are a result of loss of vegetative cover, reduced surface litter, and hydrophobic soils. This has been observed during the past few years in the Maggie, Mile Marker, Sadler (Bruffy Canyon), Argenta, Rain, and Division fires. Generally the greatest runoff has occurred on steep wooded watersheds. Data collected from Dry Canyon, an ephemeral drainage in the Sadler Fire, showed a peak flow of approximately 2,000 cfs following an isolated high intensity rain.

A negative effect from large fires on water quality would also occur. Ash that reaches streams will raise the pH of the water. Suspended sediment, turbidity, nitrogen, potassium, calcium, magnesium, and phosphorus all may increase in streams following wildfire as well as the alteration of the timing and intensity of peak flows. Other water quality impacts include an increase in metals, such as manganese, iron, and aluminum.

Negative impacts would be the greatest following severe fires, especially in steep watersheds. The beneficial effects of an increase in herbaceous cover, of an increase in species age diversity and structure across the landscape, and of the resultant positive effect this would have on water resources would not be achieved. The increased severity of fires would increase the chance of hydrophobic soils and therefore reduce infiltration.

**Cumulative Impacts** – The No Action alternative places less emphasis on fire prevention. The cumulative impact would be an increased occurrence of large scale fires and the subsequent negative impacts associated with that. This would result in increased amounts of riparian habitat affected by wildfire and negate all other management efforts identified in the Elko/Wells RMP, including implementation of grazing management changes, to improve riparian habitat conditions and the attainment of Elko/Wells RMP objectives and Standards and Guidelines for Rangeland Health.

### 2. Full Suppression Alternative

The effect of the Full Suppression alternative would be similar to the No Action alternative, except that the buildup of fuels would become more extensive and thus fires could be the most severe. The negative effects on water resources described for the No Action alternative would be magnified under the Full Suppression alternative; i.e., peak and total stream discharges, stream temperatures, and nutrient and sediment loading would increase further.

**Cumulative Impacts** – The cumulative impacts are the same as those described for the No Action alternative.



### 3. Limited Suppression Alternative

Under the Limited Suppression alternative, the risk to water resources would occur sooner than under the No Action and Full Suppression alternatives. With minimal efforts on suppressing fires and post-burn rehabilitation of a site, nutrient and sediment loading, spikes in peak and total stream discharges, and an increase in stream temperatures would become common in the water bodies in the District.

**Cumulative Impacts** – The cumulative impacts are the same as those described for the No Action alternative.

### 4. Proposed Action

The management of these resources occurs in the A3 polygons and provides guidance aimed at the protection of these resources. The Proposed Action (i.e. an integrated approach to fire management) and guidance found in polygon A3 would result in increased fire prevention, leading to less erosion and impacts to water resources due to a decrease in large wildfire events. Fire, whether natural or prescribed, reduces vegetative cover. Water availability in soils should increase where either prescribed fire or the management of unplanned ignitions is used to remove deep rooted, heavy, water-using species and create openings for the establishment of grass and forb cover. Therefore, fire will eventually increase infiltration unless the soil becomes hydrophobic, which is less likely with prescribed fire. However, fire inevitably leads to runoff and at least localized erosion and increased sedimentation levels. Immediately after an area has burned, negative effects on surface waters from fires would include increased surface runoff and the associated increased turbidity from sediment in stream flows, greater peak flows and total discharge, changes in pH, and increased nutrient levels in streams. Additionally, if natural regeneration does not occur, or rehabilitation efforts are not successful and vegetative cover is not reestablished, there would be increased runoff and sedimentation in surface waters. Because prescribed or managed fires are of smaller scale than wildfires and are used in accordance with the management objectives of a site, the potential effects in the future should be minimized.

Post fire erosional processes that deliver sediment to streams over long periods of time due to the lack of re-vegetation, roads, or fire lines can have long-term negative effects on aquatic ecosystems (Lotspeich et al. 1970; DeByle and Packer 1972). However, short-term pulses of sediment and large woody debris, often associated with functioning terrestrial and aquatic ecosystems during post-fire landslides and debris flows, may be beneficial. Over time, large woody debris and sediment are moved downstream by fluvial processes which form productive aquatic habitats (Reeves et al. 1995, Benda et al. in press, Miller et al. in press; Minshall in press). The most effective way to reduce the negative effects of fires on aquatic systems is to protect the evolutionary capacity of these systems to disturbance (Bisson et al. in press). Restoring physical connections among aquatic habitats may be the most effective and efficient step in restoring or maintaining the productivity and resilience of many aquatic populations (Bisson et al. in press; Dunham et al. in press; Rieman et al. in press, Rieman and Clayton 1997, Pilliod et al. in press). We should focus on protecting aquatic communities in areas where they remain robust and restore habitat structure and life history complexity of native species where it is possible (Gresswell 1999). However, where restoring connectivity between aquatic populations is not feasible, active management to reduce the impacts of fires



and fire suppression actions may be an important short-term conservation strategy (Brown et al. 2001; Rieman et al. in press).

As discussed in the BA, wildfire and fire suppression can effect aquatic biota. Minshall et al. (1989) speculated that chemical toxicity from smoke or ash would cause fish mortality in second and third order streams. Ammonia and phosphorus levels have been documented to be above lethal limits to fish during fires (Spencer and Hauer 1991). Water temperature may also increase after riparian vegetation is burned, however, predicting the biological consequences is difficult (Beschta et al. 1987).

Macro invertebrates can also be affected by wildfires (Minshall et al. 1995, Minshall in press, Spencer et al. in press). The most ecologically significant change is an apparent shift in functional feeding groups from shredder and collector dominated communities, usually associated with allochthonous production from the riparian vegetation, to scraper and filter feeder dominated communities (autochthonous production from increased sunlight and temperature) (Jones et al. 1993).

The use of retardant and foams and construction of dozer lines in the proximity of streams are the primary concerns with fire suppression activities. The use of heavy equipment near streams may destroy riparian vegetation, disturb stream channels, and increase sedimentation. Fire retardants and surfactant foams are known to be toxic to aquatic organisms (Jones et al. 1989, Gaikowski et al. 1996a, Gaikowski et al. 1996b, McDonald et al. 1996, McDonald et al. 1997, Buhl and Hamilton 1998, Buhl and Hamilton 2000, Little and Calfee 2000, Little and Calfee 2002a, Little and Calfee 2002b, Little et al. 2002). The BA and SOP's outlined in Chapter 2 provide procedures aimed at protecting these resources.

Using well-planned fire prevention techniques or prescribed fires in which factors such as season of burn, fire severity, fuel loading, fuel and soil moisture content and relative humidity are carefully monitored, the Proposed Alternative is expected to increase the percentage of herbaceous cover, as well as increase species age diversity and structure across the landscape. This would lead to a reduction in fuel loads that in turn would reduce the occurrence of large-scale destructive fires and the negative after-effects from such events on water resources (increased erosion leading to siltation of water bodies). Although the initial impact associated with many fire prevention activities may be to water resources (i.e., initial erosion associated with most fire prevention treatments), the net effect of the Proposed Action on water resources is expected to be beneficial. A more detailed evaluation of potential effects of water resources is described in the biological assessment.

**Cumulative Impacts** – The integrated approach and use of prescribed fire and other fire prevention measures are expected to lead to increased herbaceous cover, an increase in species age diversity and structure across the landscape, reduced surface runoff, and reduced sediment and nutrient loading. This in turn will reduce impacts to critical habitats such as riparian areas and will also benefit sensitive species living in these environments.



## **G. Wild and Scenic Rivers**

### **1. No Action Alternative**

Under this alternative, the buildup of natural fuels is expected to lead to hotter and larger fires, which in turn would minimize the beneficial mosaic pattern in the open slopes and interior basins. This could lead to large-scale fires within the entire river corridor, which would reduce the scenic, fisheries and wildlife values of the eligible river segments.

**Cumulative Impacts** – Appropriate grazing management systems may improve the riparian habitat; however, if the uplands degrade into large expanses of even-aged or disturbed vegetation communities, the possibility exists for wildfire to damage the riparian areas.

### **2. Full Suppression Alternative**

Similar to the No Action alternative, under the Full Suppression alternative, the buildup of natural fuels is expected to hasten compared to the other alternatives. This would lead to hotter and larger fires, which would in turn minimize the beneficial mosaic pattern in the open slopes and interior basins. This could lead to large-scale fires within the entire river corridor, which would reduce the scenic, fisheries and wildlife values of the eligible river segments.

**Cumulative Impacts** – Appropriate grazing management systems may improve the riparian habitat. However, if the uplands do not have a vegetative mosaic, the possibility exists for a wildfire to damage the riparian areas.

### **3. Limited Suppression Alternative**

SOPs would continue to prioritize the protection of streams through appropriate fire prevention measures. The buildup of fuels adjacent to riparian zones is expected to be minimized under this alternative. With minimal effort on fire prevention, suppression and rehabilitation, vast expanses of even-aged vegetation or degraded vegetation communities are expected to characterize the upland landscape. Over time fuel loading would not be moderated, and longer vegetative recovery, increased erosion, channel incising and stream sediment loading are expected, which would reduce the scenic, fisheries and wildlife values of the eligible river segments.

**Cumulative Impacts** – The effects of low levels of fire prevention, suppression, and rehabilitation could negate any grazing management strategies that could improve wild and scenic rivers.

### **4. Proposed Action**

An integrated approach to fire prevention, use of suppression techniques and rehabilitation following fire would help maintain the plant diversity and health of fire-dependent ecosystems in the segments of the South Fork Owyhee River designated as wild (23.6 miles) and scenic (1.0 mile), and a segment (2.2 miles) of Fourmile Creek found eligible for wild river status.



Prescribed fire may not be a viable option within portions of the South Fork Owyhee River segments where sparse fuels would limit the fire's spread and its effectiveness. Such case-by-case conditions would be evaluated for all existing and eligible wild or scenic rivers and other fire prevention techniques may be considered. Where there are slopes, small basins or other areas with suitable vegetative cover, managed prescribed fire could be used. In addition, the use of naturally ignited fire within designated or eligible river corridors is not expected to affect the scenic, recreation, geologic, fisheries, wildlife or cultural values associated with those rivers. The use of fire prevention and suppression techniques, and rehabilitation within the WSA's encompassing the South Fork Owyhee River and Fourmile Creek must comply with the WSA Interim Management Guidelines, as well as SOPs pertaining to protection of riparian areas described in Chapter 2.

Prior to using fire prevention measures within an existing or eligible wild or scenic river, the management objectives and site-specific constraints would be analyzed, public and agency input would be obtained, and required surveys would be conducted. Over time, an integrated approach to fire management is expected to improve the conditions, as warranted, within existing or eligible wild or scenic rivers; and just as important, to improve the conditions to areas adjacent to these valuable river systems. These expected beneficial effects would, in turn, reduce the risk to the rivers from negative influences that may be near it.

**Cumulative Impacts –** The Wild and Scenic designated waters are located in WSA's. Under WSA guidelines, fire is allowed as a natural part of the ecosystem. Suppression efforts associated with wild fire are considered only as an emergency tactic. In all cases, the use of mechanized equipment must be considered in the context of not impairing the suitability of the WSA. If appropriate grazing management systems are used to improve riparian areas that are within or downstream of grazing allotments, the cumulative impacts would be that of regaining a more natural diversity of vegetation type, structure and age, thereby improving riparian habitat overall. If appropriate grazing management systems are not in place, natural fire may impact riparian areas, putting these systems at risk for increased losses of vegetation, accelerated rates of erosion and increased sediment loading.

## **H. Wilderness**

### **1. No Action Alternative**

Under this alternative, the use of more flexible management techniques would not be available. The potential for stand-replacing fires would be increased in the mixed conifer communities, as compared to the Proposed Action.

**Cumulative Impacts –** The effects of past, present and future fire suppression activities would be that of increasing fuel loadings and continuity, and increasing the possibility of large stand-replacement wildfires. Fire suppression activities, together with minimized efforts at fire prevention, would be expected to move vegetation communities toward a climax condition. Wildfires of high intensity would possibly lead to the colonization of the areas by invasive plant species. These cumulative effects would degrade the vegetative landscape surrounding the WSAs, which would in turn increase the risk of negative effects within each WSA.



## 2. Full Suppression Alternative

Similar to the No Action alternative, under the Full Suppression alternative, the use of more flexible management techniques, such as prescribed fire, management of unplanned ignitions, and other fire prevention measures to improve or enhance the naturalness of a WSA would not be available. The potential for stand-replacing fires would be increased in the mixed conifer communities, beyond that expected from the Proposed Action and No Action alternatives.

**Cumulative Impacts** – The effects of past and present fire suppression activities and increased future suppression would be that of increasing fuel loadings and continuity, and increasing the possibility of large stand-replacement wildfires. Long-term fire suppression activities, together with minimal fire prevention efforts and rehabilitation after fire, would be expected to move vegetation communities toward a climax condition. These cumulative effects would degrade the vegetative landscape surrounding the WSAs, which would in turn increase the risk of negative effects within each WSA.

## 3. Limited Suppression Alternative

Under the Limited Suppression alternative, the use of more flexible management techniques, such as prescribed fire, management of unplanned ignitions, and other fire prevention measures to improve or enhance the naturalness of a WSA would be less available. Because efforts at fire suppression would be minimized, the potential for stand-replacing fires would be increased in the mixed conifer communities, as compared to all other alternatives.

**Cumulative Impacts** – The effects of past and present fire suppression activities and decreased future suppression, together with lesser efforts at fire prevention and rehabilitation after fire, would be similar to those noted for the No Action and Full Suppression alternatives above. The anticipated cumulative effects would degrade the vegetative landscape surrounding the WSAs, which would in turn increase the risk of negative effects within each WSA.

## 4. Proposed Action

Fire management activities, such as prescribed fire, management of unplanned ignitions and the use of other fire prevention measures conducted in accordance with the management objectives of the site could help maintain the plant diversity and health of fire-dependent ecosystems in WSAs. These measures could improve or enhance the naturalness of a WSA through the restoration of native plant communities. These measures could also be used to limit the size of stand replacement fires within mixed conifer communities in WSAs by reducing fuel continuity and fuel loading.

The majority of the D fire management categories surround WSAs. The descriptions for these polygons recommend the use of prescribed fire to reintroduce fire into the ecology of the area, and stress that fire suppression methods must have a minimum impact on the land. Prior to using fire management measures within a WSA, the management objectives and site-specific constraints would be analyzed, public and agency input would be obtained, and required surveys would be conducted. During the implementation of future actions, all SOPs and existing guidance (BLM Manual Handbook H-8550-1, Interim Management Policy for Lands Under Wilderness Review)



pertaining to WSAs would be upheld. Over time, an integrated approach to fire management is expected to improve the conditions within a WSA, as warranted, and (just as important) to improve the conditions in areas adjacent to a WSA. These expected beneficial effects would in turn reduce the risk to a WSA from negative effects that may surround it.

**Cumulative Impacts** – Integrated fire management would increase vegetative mosaics, and reduce fuel loading and continuity. This would assist in the restoration of native plant communities and fire frequency return intervals.

## **I. Areas Of Critical Environmental Concern (ACEC)**

### **1. No Action Alternative**

The Salt Lake ACEC occurs in areas are dominated by desert shrub plant communities that do not have fire as part of their natural ecology. Because occurrence of natural fire is very low and the general management objectives for these plant community types is to maintain the native community, fire prevention treatments would not be proposed in these areas. Therefore, the Salt Lake ACEC would not be impacted by the No Action alternative.

**Cumulative Impacts** - Fire does not play an important role in the natural ecology of the Salt Lake ACEC area. The No Action alternative would not result in any cumulative impacts affecting the management objectives to preserve the integrity of the Salt Lake ACEC for peregrine falcon reintroduction.

### **2. Full Suppression Alternative**

The impacts to the Salt Lake ACEC from the Full Suppression alternative would be the same as the No Action alternative.

**Cumulative Impacts** - Cumulative impacts to the Salt Lake ACEC from the Full Suppression alternative would be the same as the No Action alternative.

### **3. Limited Suppression Alternative**

The impacts to the Salt Lake ACEC from the Limited Suppression alternative would be the same as the No Action alternative.

**Cumulative Impacts** - Cumulative impacts to the Salt Lake ACEC from the Limited Suppression alternative would be the same as the No Action alternative.

### **4. Proposed Action**

The Salt Lake ACEC occurs within the proposed fire management plan B-3 polygon. As described in the No Action Alternative, these areas are dominated by desert shrub plant communities that do not have fire as part of their natural ecology. Because occurrence of natural fire is very low, the Salt Lake ACEC would not be impacted by the Proposed Action.



**Cumulative Impacts** - Cumulative impacts to the Salt Lake ACEC from the Limited Suppression alternative would be the same as the No Action alternative.

## **J. Recreation**

### **1. No Action Alternative**

The potential for large and severe fires that could affect both dispersed and developed recreation would continue to increase. Reductions of viable wildlife habitat and areas characterized by a vegetative mosaic would decrease the value of the area for most outdoor recreation. Safety concerns would be raised if wildfires occurred in or near developed recreation sites.

**Cumulative Impacts** – Overall habitat values would decrease in the area, reducing wildlife viewing opportunities for users.

### **2. Full Suppression Alternative**

Due to an increased build-up of fuels, the potential for large and severe fires that could affect both dispersed and developed recreation would be higher than expected under the No Action alternative. This would further decrease wildlife habitat value and the area of vegetative mosaic. The initial emphasis on suppression would reduce the safety risk near developed recreation sites; however, the continued accumulation of fuels would increase safety concerns in developed recreation sites over time.

**Cumulative Impacts** – The cumulative impacts would be a build-up of fuels increasing the potential for larger wildfires. The result would be reduction in the mosaic pattern of vegetation and overall habitat quality, effecting wildlife and hunting opportunities.

### **3. Limited Suppression Alternative**

Both the near and long-term safety risk near developed recreation sites would increase under this alternative. Because minimal efforts would be placed on prevention methods to reduce the size of fire, on fire response to suppress fire, and on post-burn rehabilitation, the effects on wildlife and visual diversity would diminish camping, sightseeing, photography, and hiking recreational values throughout the District.

**Cumulative Impacts** – The cumulative impacts would be greater than those noted for the No Action alternative.

### **4. Proposed Action**

Generally, recreation users would be displaced from a burned area, and this displacement could continue for several years if restriction of the site is necessary to ensure successful natural regeneration. Similarly, if rehabilitation of the area is determined to be necessary, then displacement of recreators would be necessary until the applied rehabilitation efforts have been completed and deemed successful. Aside from these types of access restrictions and for the first few spring seasons following fire, the flush of annuals that develop would be a positive effect on the camping, sightseeing, photography and hiking recreational values by increasing the visual diversity throughout the area. The vegetative diversity would encourage more wildlife diversity, which would



also contribute to the recreational enjoyment in the area. Other fire prevention measures (e.g., creation of fuel breaks or fire access roads, and reduction of fuel loads via mechanical or chemical methods) that may be applied in or near recreation areas would not be expected to diminish the recreational value of those areas due to the relatively small amount of area that would generally be affected by those measures.

Mechanical treatments, chemical applications, prescribed fire and the management of unplanned ignitions in or near developed recreation sites could affect the quality of a visitor's experience because of vegetation clearing, smoke, health, and safety concerns. These negative effects would be temporary. Protection of developed recreation sites could be improved through the use of fire prevention measures to create fuel breaks around these areas.

**Cumulative Impacts** – The development of vegetative mosaics, which would result from applied fire prevention and rehabilitation measures, would be expected to increase the number of wildflowers and wildlife species available for viewing. Several of the surface waters in the District are used for recreation. The benefits derived from improving the vegetative conditions throughout the District would minimize erosion that would, in turn, benefit the water resources and recreational activities associated with those resources. An integrated approach using a variety of fire prevention, response and rehabilitation techniques could improve wildlife habitat diversity. This could lead to increased recreational opportunities associated with wildlife viewing and hunting.

## **K. Visual Resources**

There are a number of considerations with respect to fire, fire management, and the nature and condition of the endemic plant communities that influence evaluation of the alternatives relative to visual resource management. They include the following:

- The diversity of plant communities developed in this region, in response to pre-existing, natural environmental conditions, has the highest level of visual interest. Natural communities reflect the desirable visual qualities of harmony, diversity and overall unity/integrity.
- The noxious weeds and invasives (principally cheatgrass) in this area have created extensive monocultures that lack the diversity and visual interest of the naturally occurring vegetation, which they have replaced. Further, they are prone to, and often advantaged by fire, which regularly creates extensive blackened areas that retain the scars of fire suppression activities. Together these conditions create contrasting form, line, color, and textural modifications to the landforms and vegetation.
- Both fire prevention and suppression activities can create unnatural modifications, which remain indefinitely in this arid region without active rehabilitation.
- There are differences in the natural role of fire in the maintenance of health and regeneration within the various plant communities that exist within the Elko District. Some are fire adapted and others are not. Recognizing these differences and formulating plans around their differing adaptations will provide the best chance for renewing and/or maintaining the desirable visual characteristics of each community. A uniform approach will unnecessarily disadvantage some communities.
- General Fire Management: Among other things, the general fire management element sets the FMC allocations, which differ among the four alternatives, from



nearly uniform prescriptions to those with a mix of approaches. Those with nearly uniform prescriptions do not give adequate consideration for the variations in plant community adaptation and conditions that exist within the District. As a result, they would disadvantage certain plant communities while favoring others to the detriment of the visual condition and character of the landscape.

- **Fire Prevention:** This component addresses reduction in fuel loads which will reduce the potential for very large fires over time and thus the extensive blackened areas. Fire prevention also can create visual contrast through the development of green strips and fire access roads that can create contrasting form, line, color and texture if poorly planned from the visual resource perspective.
- **Fire Response:** Fire suppression activities create visual contrasts in the form of bladed roads and fire breaks. The resulting form, line, color and texture contrasts can be highly visible and of long-term duration in this open and arid landscape. While aggressive fire response may reduce the extent of blackened areas in the short run, over time it creates increased fuel loads that make suppression more difficult and the extent of long-term disturbance greater.
- **Fire Rehabilitation:** Rehabilitation of fire damaged areas and the suppression-caused landscape disturbances that accompany it are of critical importance to the long-term reduction of visual contrasts. As with the other fire management elements, fire rehabilitation should be given greater attention in those areas of greater visual sensitivity (VRM Classes I and II) and lesser attention in VRM class III and IV areas.

Together, these landscape and fire management considerations formed the basis of the visual resource assessment and comparison of alternatives. A brief description of the results follows.

## **1. No Action**

The No Action alternative would be a continuation of the present situation with regard to fire management. This would result in increasing fuel loads and large fires with the extensive contrasts created by the fires and associated aggressive fire suppression activities. This would create short-term visual impacts as well as contribute to the continued long-term expansion of invasives with a corresponding decrease in visual variety and interest.

Fire rehabilitation would remain a high priority throughout the District, but would no doubt be difficult to completely achieve over time due to the increased frequency and extent of fire. Without active involvement of the visual resource staff, these treatments may not be effective in maintaining compliance with VRM class objectives of VRM Class I and II lands.

**Cumulative Impacts** – The cumulative impacts would increase as larger fire occur which require additional suppression activities. An addition impact would be a loss in the stand and age types of vegetation, decreasing visual quality.

## **2. Full Suppression**

This alternative is similar to the No Action alternative except for two important distinctions that have visual resource implications. One difference is the increased allocation of land (95%) where fire would be considered negative to the lands and resources. Under this alternative there would be no lands where fire would be



considered a benefit. This would substantially increase the fuel loading and further favor invasives beyond what is currently taking place. Secondly, under the Full Suppression alternative, there would be a low emphasis on rehabilitation. When combined, the effects of these two differences would result in larger fires, increasing invasives, and increased long-term visible landscape contrast as a result of suppression activities.

**Cumulative Impacts** – The cumulative impacts would be greater than those noted for the No Action alternative.

### 3. Limited Suppression

The FMC premise under this alternative is that fire is beneficial on 95% of the lands in the District, and that there would be limited prevention, response and rehabilitation of fire events. Because there is little active management, large fires would continue throughout the District where fuel loads are high. Response to these fires would be less than is currently the case, which would reduce the ground disturbance of fire fighting. However, the extensive contrasting burned areas will continue, which will favor a further increase of invasive plants in areas unburned and limit the rehabilitation of areas already burned.

**Cumulative Impacts** – The cumulative impacts would be greater than those noted for the No Action alternative.

### 4. Proposed Action

This alternative represents an integrated approach to fire management in each of the four fire management elements. As a result, it provides greater flexibility in the formulation of specific area plans and would therefore facilitate prescriptions that are more appropriate to the vegetative conditions of an area. This would favor the long-term reestablishment of plant communities with a more natural and visually appealing composition. Specifically, the FMC allocations are closer to the proportions of natural fire adapted plant communities, and they provide the flexibility of treatment options needed given the range of current plant community conditions.

The integrated approach to fire prevention is also desirable in that fire prevention activities can be both positive and negative as noted above. An integrated approach provides the flexibility to use more aggressive approaches in areas of lesser visual sensitivity and less aggressive and damaging measures in areas of higher sensitivity. Of particular concern is the creation of fire access roads in areas of high visibility. Similarly, fire response can create lasting scars. The integrated approach to fire response also would provide a measure of flexibility in fire suppression that could be tailored to the visual sensitivity of an area.

This alternative's approach to rehabilitation also allows the flexibility to respond with increased emphasis in areas of high visual sensitivity. This is one of the most critical of the fire management elements and needs particular attention to reduce long-term visual impacts.

**Cumulative Impacts** – The long-term effect should be an increase in habitat quality and therefore improved visual quality.



## **L. Wildlife**

### **1. No Action Alternative**

This alternative would limit the tools available to treat wildlife habitat areas to create the desired mosaics that favor most wildlife. Allowing continued fuel buildup through high fire suppression and low fire prevention increases fuel loading so that when wildfires occur they would burn at higher intensity levels over larger areas. This increases the chances of stand replacement fires, which reduces the quality and viability of numerous acres of wildlife habitat.

**Cumulative Impacts** – Past, present and future suppression efforts that would characterize the No Action alternative would lead to heavier fuel buildup, which in turn would lead to larger burned areas, reduced edge effects, reduced cover and vertical structure, and reduced browse for wildlife species. The effects of severe fires (e.g., higher temperatures and the resultant mortality of underground roots, burls, and seed; increased erosion) would increase the cost of rehabilitation efforts and the implementation of SOP's. The likelihood of success of the rehabilitation of wildlife habitat following large stand replacement fires would be reduced. Potential loss of important wildlife habitat (i.e., open stands of sage brush habitat with native grasses and forbs important for sage grouse breeding grounds) could result if the vegetative structure is changed (i.e., to closed canopy brush or non-native invasive species) as a result of large fires and/or decreased fire prevention. Wildlife species diversity would likely decrease in areas where large fires have occurred and closed canopy monocultures have established and continue to be perpetuated by shortened fire cycles. These negative cumulative impacts for the No Action alternative become increasingly worse over time for the viability of wildlife.

### **2. Full Suppression Alternative**

This alternative would limit the negative local effects of wildfire, as in the No Action alternative, because of the increase in fire suppression activities. However, fire rehabilitation and fire prevention activities would be low in this alternative. When large stand fires occur due to high fuel loads from high fire suppression, rehabilitating the lost wildlife habitat would become very costly and the success of reestablishment severely reduced.

**Cumulative Impacts** – As discussed in Chapter 3.0, Affected Environment, in both short and long-term management scenarios of the natural lands within the District, wildlife would not benefit from a Full Suppression alternative to fire management. Large scale losses of habitat diversity would result from increased fuel loads (i.e. decreased emphasis on fuels prevention would result in increased shrub dominance and reduced herbaceous species in the plant community) and the eventual increase in number of large scale fires.

### **3. Limited Suppression Alternative**

A Limited Suppression alternative would be the most detrimental to wildlife in general because a limited fire suppression plan coupled with limited fire prevention measures would likely result in large catastrophic fires that would replace large contiguous stands of important wildlife habitat. Additionally, this alternative would only allow limited



amounts of fire rehabilitation (due to the magnitude of burn areas) and limited fire management, which could lead to unforeseen losses of wildlife populations in areas that would normally be protected from burning within a given wildfire event.

**Cumulative Impacts** – Much of the District is already under stress from the impacts of the numerous large fires in recent years. This alternative would exacerbate the problem for wildlife species and their habitats. As discussed in Chapter 3.0, Affected Environment, in both short and long-term management scenarios of the natural lands within the District, wildlife would not benefit from a Limited Suppression alternative to fire management.

#### 4. Proposed Action

Wildlife is managed under most polygon categories. In general, wildlife responds well to recently burned habitat. Depending on fire intensity and pre-fire vegetative conditions, burned areas usually produce an abundance of grasses and forbs. However, woody species that are burned and do not resprout can be lost as browse for a longer period of time. This could cause a detrimental effect on big game winter ranges. A small, block-mosaic design and avoidance of important upland browse zones, fawning, and upland game bird nesting areas would minimize detrimental effects on wildlife habitat. The mosaic patterns created by habitat manipulations would insure that vertical contrast would be created. Vertical contrast is needed for thermal cover, escape routes, and hiding areas. Mosaics also create ecotones where species, both plant and wildlife, of different communities interact. Impacts to the majority of wildlife species from the Proposed Action would be minimal. Limited mortality of reptiles and birds, especially ground nesters, may occur when fires are stand replacing and severe. Some species shift may occur when, for example, burned areas provide attractive foraging areas for antelope by improving production and diversity of grasses and forbs.

Mosaic burning patterns for planned burn units will help reduce the size and severity of wildfires, thus reducing the impacts such large and severe fires can have on wildlife and their habitats. Green strips and/or restoration projects designed to act as fuel breaks would provide protection to adjacent unburned habitats. Fire suppression measures should not have significant environmental consequences in upland habitats and would benefit wildlife species, particularly big game winter foraging areas and sage grouse habitats, when used to control large severe fires. Fire rehabilitation measures will continue to reestablish habitat for wildlife species while preventing soil loss and water quality problems. Existing habitats affected by exotic species invasion, loss of diversity, or abundance of fuel loads, can potentially be improved by the proposed alternative. The integrated approach of the Proposed Action will benefit wildlife species in the majority of taxonomic categories as fuel loads are reduced and patchy vegetation patterns are reestablished. The Proposed Action FMC's and polygon descriptions outlined in Chapter 2 provide additional direction aimed at the protection of specific wildlife resources. In some cases, polygons were formulated to minimize impacts to wildlife and improve habitat (see Chapter 2, Polygon B9).

**Cumulative Impacts** – The Elko District has created over 50 wildlife water catchments and has used prescribed fire, brush beating, and some chaining in the past to improve wildlife habitat. Currently, approximately 30 acres of selective cutting is done per year to improve wildlife habitat in pinyon-juniper habitats. Seed mixes used on all fire rehabilitation and range seedings are selected specifically to include wildlife food and



cover species where determined appropriate. Through the allotment evaluation process, standards and guidelines for rangeland health and the multiple use objectives outlined in the Elko/Wells RMP are evaluated for attainment or non-attainment. Where wildlife habitat objectives are not met, appropriate changes in management are implemented to ensure progress toward meeting stated goals and objectives. The cumulative impacts of these wildlife habitat improvement techniques combined with an integrated approach to fire management would increase wildlife habitat diversity and condition. The overall impacts would be beneficial to wildlife populations in the District.

## **M. Special Status Species**

### **1. No Action Alternative**

Fuel loadings would continue to increase, possibly leading to severe fires that could damage sensitive habitat for threatened and endangered species that have been identified in the Elko District (see Appendix 3). The options for improving or expanding the habitat for these species via mechanical, chemical, and grazing methods, and through the use of fire would be reduced. This could decrease the opportunity for recovering and delisting these species. Rehabilitation efforts in fire-damaged critical species habitats would continue, but efforts may be futile for species recovery in severe stand replacement fires.

**Cumulative Impacts** – Past, present and future fire suppression efforts could reduce the range of fire-adapted species by changing the habitat and eliminating the ecological conditions needed by these species. Cumulative costs for fire suppression efforts and fire rehabilitation in critical habitat areas could become exorbitant if not balanced with fire prevention measures. An increased incidence of fire suppression, versus an integrated approach to fire management, would result in the increased use of fire suppression chemicals and in turn increase the chances for direct impacts to aquatic life should chemicals come in contact with riparian/wetland areas. In general, under the No Action Alternative, an increase in fire suppression would result in a long-term increase in fire impacts to special status species and their habitat. This would be counteractive to all other resource management activities being implemented in accordance with the Elko/Wells RMP and local conservation plans.

### **2. Full Suppression Alternative**

Increasing fire suppression efforts will perpetuate fuel build in habitats occupied by or adjacent to those occupied by sensitive species (i.e. sagebrush-grassland communities for sage grouse). Limiting controlled fire situations coupled with low fire rehabilitation and increased use of fire suppression chemicals would likely be detrimental to many sensitive species (particularly aquatic species). Soil erosion and sedimentation into aquatic habitats would likely increase due to severe fires from extensive fuel build-up. The use of chemical suppressants would likely increase under the Full Suppression Alternative and the potential for direct or indirect (through run-off) introduction of fire chemicals into streams and/or aquatic habitats would increase. These actions would be reactionary rather than preventative. This could increase the potential of killing listed fish and amphibian species, such as the Lahontan cutthroat trout.

Removing fire (as much as possible) from the management of the District public lands will allow for continued loss of sagebrush habitats through overgrowth of sagebrush.



Because sage grouse require a more diverse age class structure, proposed burns would allow for a mosaic management of the land, increasing habitat for the sage grouse and other sagebrush obligates, rather than decreasing it through a Full Suppression management alternative. Impacts, at a minimum, would include loss of habitat due to severe stand-replacing fires, loss of habitat diversity due to a dominance of climax vegetation communities and early successional communities, and increased impacts from sedimentation loads.

**Cumulative Impacts** – The cumulative impacts would be similar to those noted for the No Action alternative.

### **3. Limited Suppression Alternative**

Impacts of limited fire management, response, prevention and rehabilitation would result in more detrimental effects to Federally listed and BLM sensitive fish and wildlife than a Full Suppression alternative. Fire would not be as closely managed; increasing the likelihood that special status species habitat would be lost due to larger fires. In addition, the listing of species being considered for possible listing as a threatened or endangered species could become justifiable because large populations of species could be immediately destroyed or indirectly affected through the loss of habitat due to large severe fires left to burn. Additionally, Lahontan cutthroat trout and other listed species with limited population sizes may be further impacted by a Limited Suppression Alternative due to the loss of individuals from low fire suppression activities in critical habitat areas.

**Cumulative Impacts** – Cumulative impacts would be compounded by limited fire management activities in a District already stressed from a history of high fire suppression. Without population monitoring, rehabilitation of highly disturbed habitat, fire response measures to avoid loss of critical habitats, and fire prevention measures to keep the system healthy, listed species decline could be a long-term problem.

### **4. Proposed Action**

Threatened or endangered species would benefit from an integrated approach to fire prevention measures and rehabilitation, as described in the Proposed Action. Fire prevention measures would reduce the risk of severe large fires in sensitive habitat that would result in further loss of special status species. Fire prevention measures designed to establish required habitat characteristics in parts of a listed species historic range would reduce severe fires and loss of habitat while creating potential habitat. Rehabilitation of wildlife habitat to benefit the site-specific requirements of listed and special status species will promote population viability and recovery. This integrated approach to fire management and fire response will enable fire managers and biologists to assess a fire to determine the appropriate response level and technique needed to protect sensitive habitats. Standard Operating Procedures (SOPs) for listed and candidate species as well as polygon descriptions will be used to guide fire management officers in choosing the best approach in any given situation (see Appendix 2). These SOPs are designed to protect and minimize the loss of listed or candidate species or their habitat. The Biological Assessment (BLM, 2003) further describes potential impacts to listed species. The BA concludes that the Proposed Action may affect Lahontan cutthroat trout, the Independence Valley speckled dace, the Clover Valley



speckled dace, and the Columbia spotted frog, but that the Proposed Action is not likely to adversely affect any of these species.

As part of the Proposed Action, prescribed burning would be used as a preventative measure against large severe fires and as a means of creating more diverse habitats for plant and wildlife species. Unknown populations of special status plant and animal species in or near a treated site could be impacted, depending on the habitat requirements and reproductive ecology of a particular species. The probability of impacts to special status plant and animal species during a proposed burn would be low because each proposed project would be screened for potential impacts to threatened, endangered and special status plants and animals during the site-specific environmental analysis process. If special status animals or plants were found in a proposed burn area, the burn plan would be modified as per the Operational Procedures/Project Design.

For example, riparian/wetland habitats for the Lahontan cutthroat trout, Independence Valley speckled dace and Clover Valley speckled dace, federally listed threatened, endangered, and candidate species respectively, can be impacted by wildland fire to varying degrees. The degree of impact to these habitats is dependant upon the various parameters of each specific fire scenario that affect fire intensity and severity (i.e. topographic features, fuel loading, water levels and soil moisture characteristics, etc.). Direct species losses can occur from intense fires that result in water temperatures being increased above species critical thresholds for survival. Toxicity effects from fire suppression chemicals (i.e. surfactant foam or retardant formulations) may also occur in riparian areas, when such chemicals are applied directly into water or adjacent to water where overland erosion may cause them to enter the water. Indirect impacts to these aquatic species occurs from secondary habitat degradation due to increased erosion and stream channel incisement, lowered water tables, decreased vegetation cover for stream shading and subsequent increases in water temperatures, and increased sedimentation.

The Proposed Action is expected to result in a decrease in the amount of LCT habitat affected by wildfire. Because it has been a SOP to not apply fire suppression chemicals within 300 feet of riparian areas (unless there is a threat to human life or property) there have been no instances where fire suppression chemicals have been applied in a manner that caused them to enter directly or indirectly into the water. However, post fire evaluation of some fire incidents has indicated that, in some cases, fire impacts to LCT habitat could have been reduced had fire suppression chemicals been applied within 300 feet of the riparian area. The SOPs for species protection listed in Appendix 2 allows for a determination to be made on a site specific basis whether or not to deviate from the standard protocol and apply fire suppression chemicals within 300 feet of the riparian area. This determination would be made based on all the available information and only if it is determined that the impacts of applying retardant within 300 feet of the stream channel or across the stream channel are significantly less than the long term resource damage associated with the expected loss of riparian habitat to wildland fire. Where fire suppression chemicals are authorized within 300 feet of the riparian zone, they would be applied in such a manner and/or degree to minimize potential impacts to aquatic life. Based on the history of occurrence of wildfire in LCT habitats and the projected decreased degree of impact due to implementation of the Proposed Action, it is expected these situations would be an extremely rare occurrence. The potential effect



of chemical suppressants to listed species was evaluated in the Biological Assessment for the FMA prepared in accordance with Section 7 of the Endangered Species Act.

The existing Elko/Wells RMP states that vegetation management (i.e. treatments) in sagebrush habitats will be in accordance with the procedures specified in the Western States' Sage Grouse Guidelines, as amended, and as future studies might dictate. These guidelines were updated in 2000 (Connely, et. al. 2000). The BLM agreed via an Interagency Memorandum of Understanding to consider the new Western Association of Fish and Wildlife Agency (WFWA) Guidelines for the management of sage grouse populations and habitats in state and local conservation plans and other appropriate information in their respective planning processes. The Nevada BLM is a cooperating agency in the development of a statewide Governor's Sage Grouse Strategy. This strategy calls for the development of local conservation plans to address sage grouse population and habitat management issues. Until local conservation plans are completed, the BLM has established interim guidelines for the management of sage grouse habitats in Nevada which include SOPs for fire suppression and fire rehabilitation activities (see Appendix 2). All fuels and/or habitat treatments in sage grouse habitat will be completed in accordance with approved planning efforts and in concert with local sage grouse/sagebrush conservation planning efforts. The use of these management guidelines when implementing the Proposed Action, together with consideration of the goals and objectives of local planning efforts, will reduce the potential impacts to sage grouse.

The Proposed Action could increase brood rearing and roosting habitat for sage grouse. Reducing the occurrence and associated impacts of larger wildland fires to known sage grouse leks and brood areas would significantly reduce the potential impact to sage grouse populations. The potential to adversely impact sage grouse resources occurs when large stand replacing wildfires occur in sage grouse habitat. Planning small fuels reduction projects in these areas would reduce the likelihood of impacts to this species. Using appropriate fire control methods could reduce the impacts of large fires in known sage grouse habitats.

One of the primary objectives of the Proposed Action is to create a diverse age class structure of vegetative communities to reduce fuel loads and reduce the occurrence of large fire events. If fuels management treatments are designed in concert with local sage grouse/sagebrush conservation goals and objectives, this would provide more diverse habitat for sage grouse and other wildlife, including many sensitive species. For example, the sagebrush-grassland ecotype provides existing and potential habitat for as many as twenty sagebrush obligate wildlife species. The frequency of occurrence and dependency of the various species upon particular sagebrush-grassland habitats varies based upon the ecological condition of the sagebrush habitat. Some sagebrush obligate species thrive in a more shrub dominated ecological condition, while most prefer a more diverse shrub/herbaceous community. The greatest direct impacts would be from wildfires or vegetation treatments that occur during the breeding season of passerine birds. The integrated approach to fire management would improve habitat for sagebrush obligate species by creating a mosaic of sagebrush age classes and improved overall diversity of sagebrush and sagebrush-herbaceous communities over time. As outlined in Appendix 4, the predicted species response to the implementation of the Proposed Action in sagebrush dominated communities would be an improvement in overall species diversity.



**Cumulative Impacts** – The expected cumulative impacts for sensitive species would be the same as those noted under cumulative impacts for the Wildlife Proposed Action. An integrated approach to fire management, which includes a fire prevention program, would enhance plant species requiring fire as part of their ecological cycle. Past suppression efforts may have reduced their ability to flourish. Plants and animals, which do not have fire-adapted characteristics, could be affected if the operational design features are not followed. The cumulative affect of implementing an integrated approach to fire management will allow for successful implementation of other resource management activities designed to enhance habitat for special status species consistent with the Elko/Wells RMP and local sage grouse/sagebrush conservation plans.

## **N. Migratory Birds**

### **1. No Action**

Under the No Action alternative, limited fire prevention coupled with fire suppression activities would lead to increased fuel loadings and the continued occurrence of large scale impacts to the landscape due to wildfire. Vegetative diversity would not be accomplished due to limited fire prevention and large-scale rehabilitation efforts would continue to be needed with the potential for decreased success. The long-term loss of vegetative diversity would likely impact migratory bird species.

**Cumulative Impacts** – The No Action alternative places less emphasis on fire prevention activities and the appropriate use of fire. The result would be an increase in fuel loads and chances for a catastrophic fire. Vegetative diversity goals may not be accomplished resulting in long-term impact to migratory bird species.

### **2. Full Suppression**

Under the Full Suppression alternative, short-term impacts to migratory birds would be lessened. However, long term buildup of fuels and change to shrub dominated vegetative communities would lead to large scale fire events and the ultimate loss of vegetative diversity. Coupled with a lack of fire prevention and limited rehabilitation, this alternative would have a significant measurable affect on migratory bird populations.

**Cumulative Impacts** – The Full Suppression Alternative would be the same as the No Action alternative

### **3. Limited Suppression**

Under the Limited Suppression alternative, impacts to migratory bird populations would be similar to the Full Suppression and no action alternative. However, the long-term impacts due to loss of vegetative diversity would be realized much sooner under this alternative.

**Cumulative Impacts** – The Limited Suppression Alternative would result in larger fires without a consideration for the potential vegetative response. The result would be an increase in the homogenous vegetation types and potential for a negative vegetative response to fire (e.g. noxious weeds). This action would decrease habitat suitable for migratory birds.



#### 4. Proposed Action

The greatest threat to migratory bird populations from the effects of fire is the large scale losses of habitat diversity due to increased wildfire occurrences across the landscape. Maintaining complete, diverse plant communities is integral to conservation efforts for these species. Using an integrated approach to fire management would reduce the impacts of large-scale wildfires to migratory species. Rehabilitation of burned areas, particularly low elevation sagebrush sites vulnerable to conversion to cheatgrass types following wildfire, coupled with secondary efforts to re-establish sagebrush on the stabilized site (as necessary) should provide beneficial impacts to these species.

Fire prevention treatments would have less impact to migratory bird populations as compared to the impacts of large scale wildfires since they would be controlled actions that would take into consideration site specific resource concerns. The integrated approach to fire management which includes fire prevention, suppression, and rehabilitation would create the greatest amount of vegetative species and age class diversity across the landscape over time. This approach would be consistent with the conservation measures listed in Section 3 (e) of the President's Migratory Bird Executive Order, specifically:

- Restore and enhance the habitat of migratory birds, as practicable;
- Within established authorities and in conjunction with the adoption, amendment, or revision of agency management plans and guidance, ensure that agency plans and actions promote programs and recommendations of comprehensive migratory bird planning efforts such as Partners-in-Flight.
- Ensure that environmental analyses of Federal actions required by the NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern.

**Cumulative Impacts** – The expected cumulative impacts for migratory birds would be the same as those noted under cumulative impacts for the Wildlife Proposed Action. An integrated approach to fire management, which includes a fire prevention program, would enhance plant species requiring fire as part of their ecological cycle. This would provide the necessary diversity to support a variety of migratory bird species.

#### O. Soils

##### 1. No Action Alternative

The lack of an integrated approach to fire management within the Elko District would lead to the further accumulation of fuels, and thus the potential for more severe and large-scale fires. The occurrence of large-scale fires during high risk fire periods (July and August) followed by high-intensity summer rains would lead to severe runoff and erosion impacts, especially on steep slopes. Impacts on cryptogamic crusts could be severe if burning of heavy fuels produce soil temperatures of 176°C or higher. Because larger and hotter fires would be expected under the No Action alternative, the risk to cryptogamic crusts would increase as well. Less crust species diversity may also occur. Mosses and lichens may be lost, and only a few species of cyanobacteria may remain.



Wind and water erosion risk would increase following wildfire. If a high intensity rain occurs, before the vegetation is reestablished, rilling and/or loss of surface soil could occur. Organic matter and soil nutrients would be removed, as well as soil structure being ruined. Under this alternative the protection provided by vegetation would decrease, as would the productivity of soils.

**Cumulative Impacts** – The absence of prescribed fire and other fuel reduction methods in areas that are being encroached upon by juniper would lead to higher fuel buildups in these areas as the tree canopy increases, causing more severe fires and the accompanying loss of soil and fertility. Heavier fuel loadings in the grass/sagebrush areas would create similar conditions, increasing the loss of soil structure and increasing the potential for hydrophobicity and increased runoff. The loss of topsoil from erosion and the resultant loss of vegetative cover would negatively effect native habitats and the wildlife dependent upon those habitats. Erosion can result in unsightly scars in formerly natural terrain.

## **2. Full Suppression Alternative**

The negative effects on soil described under the No Action alternative would be magnified under the Full Suppression alternative. Full fire suppression would eventually lead to a greater accumulation of fuels, and thus the potential for the most severe, large-scale fires. With minimal efforts proposed for fire prevention and rehabilitation, the negative effects of wind and water erosion are expected to increase, and thus soil protection and productivity would decrease.

**Cumulative Impacts** – The cumulative impacts would be greater than those described for the No Action alternative.

## **3. Limited Suppression Alternative**

Under the Limited Suppression alternative, the protection of vegetation would be removed from the landscape more quickly than under the other alternatives. With minimal efforts at rehabilitation and suppression, weed infestations would be accelerated. The negative effects of wind and water erosion are expected to be the worst under this alternative. Soil protection and productivity would be lost over time.

**Cumulative Impacts** – The cumulative impacts would be greater than those described for the No Action alternative.

## **4. Proposed Action**

The effect of fire on soils depends on the soil type, soil moisture conditions, and burn severity, the latter of which is influenced by the fuel load. Soil temperature would increase both during and after a fire. During a fire, the heat transferred to the soil is influenced by the amount and type of duff and organic matter insulating the soil. Under dry conditions, soil heating impacts would be expected to be greatest in vegetation types where there is a heavy duff buildup, which is primarily found in the mixed conifer, closed canopy pinyon-juniper and mountain bh communities. After a fire, the presence of dark, burned material on the soil surface usually would cause the soil to heat up faster than vegetated or unburned soil. High soil temperatures during and after fires could negatively effect the regeneration of many vegetative species. Because a goal of the



Proposed Action is to reduce fuel loads and the occurrence of large-scale wildfires, the integrated approach to fire management would result in moderating the effects of fire on soils.

In areas where an extensive cryptogamic soil crust has formed, burns that cause the removal of the crust would lead to increased runoff and soil erosion, reduced nitrogen fixation, and decreased plant health for certain species. Because the majority of the soil crusts within the Elko District are composed of cyanobacteria, which typically recover within 1 to 5 years after a fire, the effects of fire on cryptogamic soil crust would be short term. Using an integrated approach to fire management, with its goal of reducing fire size and severity over time, this potential temporary impact to soil crusts would be minimized in scale and occurrence.

Under the Proposed Action, prescribed fires conducted at the appropriate season, in accordance with SOPs and the management objectives for the site, and followed by appropriate rehabilitation measures as warranted, are expected to lead to a healthy succession of native vegetation. The establishment of native annuals, perennial grasses and seedlings, and post-burn resprouts of the woody native species would lower the risk of wind and water erosion. The establishment of a vegetative mosaic of native plant communities would reduce the amount of erosion and thus the sediment load following rains in the first several post-burn years. This would have a commensurate reduction in siltation impacts in riparian systems and water bodies. Moreover, a reduction in the extent of even-aged vegetative stands and fuel continuity, as expected under the Proposed Action, would also reduce the risk of hydrophobicity that can occur in the sagebrush and forested areas within the District.

Mechanical clearing as a fire prevention measure, the maintenance of existing fire access roads, or addition of new roads, the creation of fuelbreaks, and fire suppression methods would all generally result in a localized increase in soil erosion. However, this impact would be remediated by a reduction in fuel loads and occurrence of large-scale wildfires, and the resultant improvement to vegetative cover and soils that are expected under an integrated approach to fire management.

**Cumulative Impacts** – Appropriate grazing management strategies in conjunction with an integrated approach to fire management are expected to lead to a higher herbaceous vegetative cover within rangelands, and a healthy succession of native vegetation in general, thereby reducing the effects of wind and water erosion in the District. Over time, improvement of the vegetative cover and a reduction in the occurrence of devastating fires will better assure the protection and productivity of soils throughout the District. Despite the usual reduction in the amount of soil-holding groundcover following fire, prescribed burning and erosion control are compatible. Smaller burn areas, cooler fires, and less plant mortality associated with periodic burning help retain important root systems that provide structure to underlying soils.

## **P. Wetlands and Riparian Zones**

### **1. No Action Alternative**

Continued fuel buildup in areas adjacent to riparian zones would increase the probability of severe fire burning into and through the riparian areas. Large fires that escape suppression attempts normally occur during July and August when the soil moisture is



the lowest in the riparian areas. Riparian areas would be most damaged by fire at this time of year. Although the No Action alternative is expected to increase the extent of wildfires over time (thereby leading to the direct and indirect effects to riparian systems noted above), impacts to wetlands and riparian systems would be similar to the Proposed Action as SOPs recommend the protection of riparian areas from devastating fire effects.

**Cumulative Impacts** – The chances of a severe wildfire burning in July or August when riparian areas are at their driest would increase. Fires of this type could lead to longer vegetative recovery, increased erosion, channel incising and stream sediment loading. Progress in achieving land use plan objectives for good riparian habitat conditions would be adversely affected by increased impacts from wildfire.

## **2. Full Suppression Alternative**

Similar to the No Action alternative, under the Full Suppression alternative there would be an increased fuel buildup in areas adjacent to riparian zones; this would in turn increase the probability of severe fire burning into and through the riparian areas. Although the Full Suppression alternative is expected to increase the extent of wildfires sooner than that expected under the No Action alternative, thereby more quickly leading to the effects to riparian systems noted above. Impacts to wetlands and riparian systems would be similar to the Proposed Action as SOPs recommend the protection of riparian areas from devastating fire effects.

**Cumulative Impacts** – The chances of a severe wildfire burning in July or August when riparian areas are at their driest would increase beyond that noted for the No Action Alternative. Fires of this type could lead to delayed vegetative recovery and increased erosion, channel incising and stream sediment loading. This could negate any management strategies already in place that could improve riparian vegetation.

## **3. Limited Suppression Alternative**

With minimal effort expended on fire prevention, suppression and rehabilitation, vast expanses of even-aged vegetation or degraded vegetation communities are expected to eventually characterize the upland landscape. Under these conditions, fires would burn hotter and would be more extensive. The result would be longer vegetation recovery, increased erosion, channel incising and stream sediment loading. Other impacts would include potential nutrient and sediment loading, spikes in peak and total stream discharges, changes in pH, and an increase in stream temperatures. The moisture present in riparian areas likely reduces fire occurrence and severity, however, large stand replacing fires from increased fuel loads or from drought conditions, could increase severe loss of important riparian habitat and long-term impacts. Without rehabilitation measures following large fires in riparian areas impacts to the streams and wildlife could be detrimental.

**Cumulative Impacts** – The expected impacts to riparian/wetlands associated with low levels of fire prevention, suppression, and rehabilitation are expected to severely impact BLM's ability to achieve Elko/Wells RMP objectives for riparian/wetland improvement.



#### 4. Proposed Action

Many of the riparian areas in the Elko District do not have surface flow and are maintained by high soil moisture content. Prescribed fire would assist in keeping these areas from being encroached upon by sagebrush and other non-riparian vegetation. However, riparian systems that do carry surface water flows, and that are not bordered by an appropriate vegetated buffer strip, would be sensitive to the effects of short-term erosion, sedimentation, turbidity, and in-stream temperature increases that can follow fire. For wetland and riparian systems in general, the optimal burning time would be when the duff and organic matter have moisture content of 100 percent or more. This would limit loss of organic material, reduce soil heating and minimize damage to rhizomes and the basal buds of the vegetation. Several critical streams are within the boundaries of WSAs, areas where prescribed burns may be used, and where unplanned ignitions would generally be allowed to burn.

In light of the numerous existing guidelines intended to protect valuable wetlands and riparian zones, the general objectives stated in the FMC polygons, and the future activity-specific analyses that would be conducted to address riparian and wetland systems where relevant, the overall effect of the Proposed Action on wetlands and riparian areas, as well as the upland habitats that surround them, is expected to generally benefit these important resources. However, depending on fire intensity and pre-fire conditions, anticipated residual impacts would include severe erosion, sedimentation, down cutting of the stream channel and lowering the water table. These impacts would degrade the health of the riparian system

**Cumulative Impacts** – Appropriate grazing management strategies combined with fire prevention techniques on adjacent areas usage could lead to healthier and more diverse riparian areas. The Proposed Action provides a strategy to lesson the frequency, size and severity of fires. This would allow the BLM to continue to use other techniques to improve riparian health without the impacts of larger fires.

#### Q. Vegetation

##### 1. No Action Alternative

Under this alternative, the likelihood of severe wildfire would increase over time. Vegetative management objectives would not be met in specific areas. As vegetative community types grow older and more decadent, species composition and productivity, and age and species diversity would continue to degrade or decrease over time. In addition, the susceptibility of vegetative communities to disease and insect infestation could increase as well. Far fewer acreages of mountain brush, sagebrush, pinyon-juniper and aspen stands, mixed-conifer communities and grasslands would benefit from fire prevention measures and prescribed fire, and more acreages would require both fire suppression measures and rehabilitation post-burn. It is likely that type conversion from shrub-grassland communities to cheatgrass or other annual species would increase, having a lasting impact on the landscape.

**Cumulative Impacts** – The trend would be towards a more climax-dominated ecological condition, which is not natural in disturbance-prone communities. The increased probability of severe wildfire could counteract the effects of appropriate grazing management systems and other management programs designed to improve/increase



healthy vegetative diversity to meet various resource objectives outlined in the Elko/Wells RMP.

## **2. Full Suppression Alternative**

Similar to the No Action alternative, under the Full Suppression alternative the likelihood of severe wildfire would increase. Less acreage of vegetation as compared to the Proposed Action would benefit from fire prevention measures. The initial need for post-burn rehabilitation is expected to decrease because most fires would be suppressed. Higher fuel loads and the resultant intense fires that escape suppression are expected to greatly increase the need for post-burn rehabilitation in many vegetation communities. Because rehabilitation would have a low activity level under the Full Suppression alternative, impacts would be greater than the No Action alternative.

**Cumulative Impacts** – Similar to the No Action alternative, the trend would be towards a more climax-dominated ecological condition, which is not natural in disturbance-prone communities. The increased probability of severe wildfire could counteract the effects of other resource management programs.

## **3. Limited Suppression Alternative**

Similar to the No Action and Full Suppression alternatives, under the Limited Suppression alternative the likelihood of severe wildfire would increase. Acreage of vegetation communities benefiting from fire prevention measures would be less than the Proposed Action. Because both fire suppression and rehabilitation would be limited, the diversity of vegetation community composition and stand age would continue to decrease.

**Cumulative Impacts** – The trend would be toward vast expanses of even-aged or degraded vegetation communities that would characterize the landscape. Without well-planned prescribed fires, with Limited Suppression and only minimal efforts at site rehabilitation, this trend would perpetuate and worsen over time. The continued trend toward large areas of degraded vegetative communities would conflict with other resource management objectives outlined in the Elko/Wells RMP, local sage grouse/sagebrush conservation planning efforts, and the Great Basin Restoration Initiative.

## **4. Proposed Action**

Current FMC's and polygon guidance have been designed for optimum vegetation response. In general, appropriate response, prescribed burning, the management of unplanned ignitions, and other fuel load reduction techniques (mechanical, chemical, and biological treatments) are expected to decrease wildfire risk, size and severity. These activities would remove ladder fuels and excess litter accumulation, reintroduce a mosaic pattern of vegetative cover types or successional stages to the landscape, reduce the flammability of vegetation at appropriate locations, and provide safe work zones and access for future fire fighting needs. Over time, a well-balanced use of fire prevention measures is expected to decrease the frequency and extent of fires and increase the ability to control and suppress fires as they occur, thereby minimizing negative effects on vegetative communities. This, in turn, is expected to moderate the need for fire rehabilitation measures.



In woody plant communities, species composition immediately following fire would temporarily shift from a dominance of woody species to a dominance of herbaceous species. However, for the fire-adapted woody plant communities, a gradual return of the pre-burn woody species would occur via the growth of resprouts or regeneration of individuals from seed. The shift in plant composition would be due to fire altering the site conditions and reducing competition for moisture, nutrients, heat and light, and by reducing accumulations of litter and humus exposing bare soil for seedling establishment. These initial conditions would favor the establishment of herbaceous species from seed stored in the soil. There would be a short-term reduction in productivity of many species; however, this would vary depending on site conditions and the proportion of vegetative regeneration. Depending on the objectives of the burn, most target species would increase in productivity within a few years following fire.

The Proposed Action would favor the woody shrub species in mountain brush communities, such as serviceberry, snowberry and ribes species (*Ribes* spp.). These species are expected to resprout vigorously following fire prevention treatments, which would promote conditions favorable for vegetative regrowth. Similarly, prescribed fires of low to moderate intensities would benefit big sagebrush-dominated communities by reducing sagebrush density, canopy cover and competition for space, moisture, and nutrients between sagebrush and other herbaceous plant species. In addition, herbaceous species such as bluebunch wheatgrass, Great Basin wildrye, bottlebrush squirreltail, Indian ricegrass, Idaho fescue, and many forbs would increase in distribution, composition and production.

The low to moderate response of vegetation in early seral sagebrush areas indicates that mechanized equipment should be used sparingly during suppression in order to avoid leaving long-lasting scars on the landscape. This and other constraints will be considered when conducting fire prevention activities in this and other vegetation communities. Overall, it is expected that through the use of habitat treatments, stand structure and age diversity would increase across a sagebrush landscape, which would in turn improve habitat value for wildlife and decrease the size of future wildfires reducing impacts to wildlife habitat.

In the woodland vegetation communities, prescribed burning alone, or mechanical or manual treatment followed by prescribed burning, would minimize encroachment by pinyon and juniper into other vegetative community types. Treatment within older pinyon-juniper woodlands would create openings in which younger stands could establish. Well planned prescribed fires and other vegetative treatments would increase productivity within decadent pinyon-juniper woodlands and expansion of pinyon and juniper into other adjacent range sites would be minimized.

Moreover, replacement of important pinyon-juniper stands from devastating large-scale fires could be minimized through beneficial fire prevention and response techniques. Implementing greenstripping and/or other fire prevention techniques in the interface of the pinyon-juniper woodland and adjacent shrub-grassland communities would help prevent wildland fires from entering woodland vegetative types. In addition, reducing fuels or otherwise thinning older stands through mechanical or chemical treatments, and then burning when there is sufficient moisture conditions would minimize the incidence of stand-replacing fires. Descriptions for some of the FMC polygons recommend the use of mechanical treatments over prescribed fires to change stand structure and



composition. In particular, pinyon-juniper woodlands that straddle boundaries between the Elko and Battle Mountain and Ely Field Office areas are at risk from large wind-driven or plume-dominated fires. The effects of fire in these areas would be minimized by applying other fire management techniques, where needed. The SOPs and site-specific considerations would be reviewed in order to meet the management objectives within woodland vegetation communities.

The SOP's for fire management in Appendix 2 incorporate recommendations from a study of aspen communities in the Elko District completed by Dr. Charels E. Kay in March of 2002. In areas where aspen species dominate, prolific resprouting of aspen following fires of moderate severity would be expected. With proper post-fire management, this would allow for existing decadent stands that lack recruitment to reestablish themselves with younger, more vigorous stands. In addition, prescribed fire would decrease encroachment by sagebrush and mixed conifers into aspen stands.

In the mixed-conifer vegetative community, reduced fuel loading and reduced fuel continuity would open up mineral soil for seedling establishment. Prescribed fire would also reduce the potential for large and lethal stand replacement fires. In particular, the present stand structure in mixed conifer woodlands on the Cherry Creek Mountains could be severely affected by an unplanned ignition. The effects of fire in this and other areas would be minimized by applying other fire management techniques, where needed. Prescribed fire may also change the species composition, resulting in increased pine populations. Opening up the stands could increase forest health by reducing competition. The SOPs and site-specific considerations would be reviewed in order to meet the management objectives within woodland vegetation communities

The Proposed Action alternative will enhance grasslands if prescribed burning is scheduled outside of times when key species are sensitive to fire (i.e., when species are actively growing or have green tissue, or when basal fuels are highly concentrated causing more intense surface fires or smoldering). There is a potential for undesirable plant species such as cheatgrass (*Bromus tectorum*) to occupy a burned site. Cheatgrass is an exotic annual with limited nutritive value for livestock and wildlife and creates a new, fire-prone environment. Fire prevention techniques would be carefully planned as to location, avoiding areas with high potential for cheatgrass conversion in order to minimize this impact. An integrated approach to fire management will also reduce the size and extent of wildfires and in turn decrease the potential for cheatgrass invasion.

Under well-planned prescribed fires in which factors such as season of burn, fire severity, fuel loading, fuel and soil moisture content, and relative humidity are carefully monitored, the Proposed Alternative is expected to improve the overall health and productivity of targeted vegetative communities. Through the use of prescribed fires or managed unplanned ignitions, and other fuel load reduction techniques (mechanical, chemical, and biological treatments), the Proposed Alternative is expected to reduce the occurrence of large-scale destructive fires and the negative after-effects on vegetation communities from such events (undesired stand conversion, increased erosion, and invasion of exotic species).

Properly conducted prescribed burns are expected to increase the diversity of successional stages in a variety of plant communities, beginning with the grass and forb-dominated vegetation types that flourish on a site the first spring season post-fire, and



progressing to more shrub or tree-dominated vegetation types. Properly conducted prescribed burns and other fire prevention techniques, fire suppression where necessary, and rehabilitation is also expected to counteract undesired vegetation community type conversions that have occurred, or undesired encroachment of species into other communities. The total result of these effects would be healthier vegetative communities that exhibit more diversity in plant distribution, composition and production. Although the initial impact associated with many fire prevention activities may be (i.e., initial erosion associated with mechanical and chemical treatments), the net effect of the Proposed Action on vegetation communities within the District is expected to be beneficial.

**Cumulative Impacts** – The allotment evaluation process sets appropriate grazing management practices and provides for rangeland improvement (vegetative and non-vegetative) projects. These, in conjunction with fire prevention techniques, appropriate fire response and post-fire rehabilitation measures, would improve the health of the vegetative communities by increasing species diversity and improving age structure, which would lead to greater vegetative production overall. An integrated approach to fire management will result in healthier vegetative communities through fire prevention techniques reducing fuel loading and creating patchy diverse vegetative communities with various age structures and seral conditions. This will lead to wildfires having less impacts to large areas. This change in vegetative structure across the landscape will provide a diversity of wildlife habitat, provide improved wildlife and livestock forage and reduce the occurrence of large severe wildfire events. This integrated approach will compliment current resource management goals and objectives outlined in the Elko/Wells RMP and other BLM initiatives such as the Governor's Sage Grouse Strategy, local sage grouse/sagebrush conservation planning efforts, and the Great Basin Restoration Initiative.

## **R. Noxious Weeds**

### **1. No Action Alternative**

The No Action alternative provides less direction on the strategies to control invasive weeds as it relates to wildland fire. In addition, limiting fire prevention activities is expected to result in a continued build up of fuels, which in turn would lead to severe fires that are known to promote the further spread of noxious weeds. The tendency for weeds to expand would likely overwhelm efforts to control weeds.

**Cumulative Impacts** – If weed control activities are not successful and if severe fires burn large acreages, the opportunities for weed colonization could increase. This would conflict with other resource management program objectives and initiatives.

### **2. Full Suppression Alternative**

Under the Full Suppression alternative, fire prevention activities would be further limited and rehabilitation efforts would be minimized. This alternative would lead to a comparatively rapid build up of fuels, which in turn would increase the occurrence of severe fires that would be difficult to suppress. This alternative is expected to hasten the spread of noxious weeds.



**Cumulative Impacts** – The cumulative impacts would be the same as for the No Action alternative.

### 3. Limited Suppression Alternative

Similar to the Full Suppression alternative, under the Limited Suppression alternative fire prevention and rehabilitation activities would be minimal. The rapid build up of fuels would lead to severe fires for which minimal suppression measures would be taken thus leading to the further spread of noxious weeds.

**Cumulative Impacts** – The cumulative impacts would be the same as for the No Action alternative.

### 4. Proposed Action

Under the integrated approach to fire management, fire prevention, fire response and fire rehabilitation have been designed to address areas with high concentrations of noxious weeds in order to reduce the possibility of their expansion within the burned areas, and invasion into adjacent areas. Strategies include high fire suppression in areas which would not have a negative vegetative response such as invasive weeds. Fire prevention activities and fire rehabilitation activities would be designed to return a favorable vegetative response.

For example, cheatgrass, a highly invasive exotic annual, is dry and extremely flammable when native perennial grasses are still actively growing. Therefore, burning within areas of dry cheatgrass will lead to the expansion of this invasive grass at the expense of the native grasses. In some cheatgrass areas, however, it may be possible to choose a prescription for burning that will favor other species. The B-1 polygons encircle District-wide areas of exotic species invasions. The integrated approach to fire management within these areas would be to use prescribed fire in conjunction with mechanical or chemical treatments to convert those areas to perennial vegetation. As an alternative method, in areas where cheatgrass invasion is a concern, a post-fire grazing plan could include a short duration of grazing in the spring as a tool to prevent the establishment or production of cheatgrass, which would reduce competition with perennial grasses. Under the Proposed Action it is expected that the large-scale, fast-burning fires that characterize the B-1 polygons can be minimized, thereby, reducing the expansion of exotics into adjacent vegetation communities and moderating the need for suppression and post-fire rehabilitation measures. In other areas, immediate suppression has been recommended if a negative vegetative response is anticipated.

In areas of closed-canopy sagebrush, prescribed fire can be used to increase the density and cover of perennial grasses and forbs and to reduce bare ground that would serve as a target for invasion of noxious weeds. Prescribed fire can be seen as a preventative treatment for areas that currently do not support large concentrations of noxious weeds. Long-term effects could include a reduction in the extent or spread of noxious weeds, because the increase in herbaceous plant cover would mean a concurrent decrease in barren, disturbed areas where weeds tend to establish. Sites with a shrub mosaic or predominately herbaceous composition would have fewer open/barren areas for weed invasion than closed stands of brush and trees with bare ground.



Prior to implementing location-specific measures to eradicate weed species, the management objectives and site-specific concerns would be analyzed, public and agency input would be obtained, surveys as required would be conducted, and documentation as required under NEPA would be prepared. During the implementation of future actions against weeds, existing SOPs and guidelines provided in existing documents would be upheld. The use of prescribed burns and other fire prevention measures to remove nonnative species, or to invigorate native vegetation as a preventative measure against future weed invasion, together with appropriate rehabilitation measures, is expected to aid in the control of weed species.

**Cumulative Impacts** – Implementation of noxious weed control, appropriate grazing management, herbicide treatments used in rangeland improvement operations, and prescribed fire can be used to improve the health of the vegetative communities. This is expected to minimize the potential for weed colonization within native vegetation communities and reduce the expansion of weeds.

## **S. Wild Horses**

### **1. No Action Alternative**

Under the No Action alternative, activities that could increase forage or create a mosaic of cover for wild horses would be conducted on a limited basis. A continued buildup of fuels would be expected to lead to more large-scale and severe wildfires. These types of fire negatively impact the availability of forage and cover for wild horses and could cause the displacement of herds. This alternative would not aid in regaining an ecological balance in areas where the long-term suppression of fires has already led to decadent and unfavorable conditions.

**Cumulative Impacts** – Increased fuels buildup, coupled with decreasing vegetative diversity and large severe wildfires, could reduce wild horse habitat and cause displacement of wild horses if the forage base was degraded enough.

### **2. Full Suppression Alternative**

Under the Full Suppression alternative, the buildup of fuels would be expected to exceed that of all other alternatives, which would perpetuate the occurrence of large-scale and severe wildfires. The occurrences of these types of fire negatively impact the availability of forage and cover for wild horses and could cause the displacement of herds. Similar to the No Action alternative, the Full Suppression alternative would not aid in regaining an ecological balance in areas where the long-term suppression of fires has already led to decadent and unfavorable conditions.

**Cumulative Impacts** – The cumulative impacts would be similar to those noted for the No Action alternative.

### **3. Limited Suppression Alternative**

Under the Limited Suppression alternative the availability of forage would increase for wild horses. However, due the minimal efforts that would be conducted to suppress fires that do not meet the objectives of the site and to rehabilitate an area post-fire, the availability of forage and valuable shelter and foaling areas would be decreased. Similar



to the No Action and Full Suppression alternatives, the Limited Suppression alternative would not aid in improving critical habitat.

**Cumulative Impacts** – The cumulative impacts would be similar to those noted for the No Action alternative.

#### **4. Proposed Action**

The Proposed Action outlines strategies for improving wild horse habitat. Short-term actions, such as fire prevention activities (e.g., prescribed burns, reduction of fuels using mechanical and chemical methods, creation of new fuels breaks and access roads) could negatively impact wild horses. If these activities are conducted within an HMA, they would be subject to review under NEPA to avoid and reduce stress or displacement of wild horses. These potential short-term impacts could be minimized by limiting such activities within HMA's, and by timing the potentially activity to occur outside of critical periods for wild horses (e.g., foaling). Post-fire rehabilitation sometimes includes emergency gathers of wild horses and could require fencing those areas to limit grazing. Close monitoring of enclosures would be conducted to ensure horses are not trapped. The integrated approach to fire management would improve range quality within HMA's, which would benefit wild horses by increasing herbaceous forage. Fire in HMA's with heavy pinyon-juniper cover could create a mosaic pattern of cover for wild horses. This integrated approach to fire management is expected to improve the vegetation communities throughout the District, and regain an ecological balance in areas where the long-term suppression of fires has led to decadent or unfavorable conditions. This objective is consistent with objectives stated within the Wild Horse Amendment (1993).

**Cumulative Impacts** – Implementation of Appropriate Management Levels (AML) of wild horses in conjunction with an integrated approach to fire management would improve habitat for horses, increase forage availability, and increase the mosaic of tree cover to provide better shelter and foaling areas.

### **T. Rangeland / Grazing Management**

#### **1. No Action Alternative**

Under this alternative the majority of fires would continue to be suppressed and the use of prescribed burning and other fire prevention techniques would be less under the No Action alternative, there would be fewer instances where livestock would be excluded from burned areas, which would in turn reduce the immediate negative economic impact to livestock permittees. Through time, it is anticipated that there would be a greater impact to range management conditions because the acreage burned by wildfires has the potential to increase as unnatural fuel loading conditions worsen and fire intensity and severity escalate. As a result of escalation in wildfire occurrence and the risk of irreparable damage to vegetative communities, the potential for recovery of these areas is expected to decrease. More allotment closures would ultimately occur under this alternative. Overall, this would result in a long-term increase in negative economic impacts to the livestock permittees in areas where these incidents occur. This long-term increase is expected to exceed the cumulative short-term economic impact to the livestock allotment permittee(s) that could occur under the Proposed Action. In addition, the potential for beneficial economic impacts resulting from use of prescribed fires, where appropriate management response is implemented, would not be realized. There



is a long-term potential for the loss of perennial grass. Competition from sagebrush and other shrubs would out-compete the perennial grasses reducing their production per plant and reducing total numbers of grass plants.

**Cumulative Impacts** – The use of appropriate grazing management strategies to improve the condition of the vegetative community would be at least partially negated by the exclusion of fire. The continued suppression of most fires could increase brush cover, thereby minimizing the conditions suitable for the establishment of herbaceous cover. Severe wildfires burning in closed canopy sagebrush would reduce the recovery rate of plant species because the increased fuel loadings would create hotter burn conditions, thereby increasing the potential for damage to plants and soil. Without an integrated fire management approach, the success of local sagebrush planning efforts and the GBRI would be impacted.

## **2. Full Suppression Alternative**

All fires would be suppressed to the greatest extent feasible and there would be few instances where livestock would be excluded from burned areas. This situation would have the lowest immediate economic impact to livestock permittees. Similar to the No Action alternative, it is anticipated that there would be a greater impact to range conditions because the acreage burned as a result of wildfires has the potential to dramatically increase in the future as unnatural fuel loading conditions worsen and fire intensity and severity escalate. Other negative effects of the Full Suppression alternative would be similar to the No Action alternative, yet more pronounced due to the emphasis on suppression and minimal efforts on the prevention of fire or rehabilitation after fires. This would result in negative economic impacts to the livestock permittees and the least benefit from the use of prescribed fires that could have been conducted in accordance with the management objectives of a site.

**Cumulative Impacts** – The cumulative impacts would be similar to those described under the No Action alternative although, in the long term, they would be more pronounced under the Full Suppression alternative.

## **3. Limited Suppression Alternative**

Because minimal efforts would be placed on suppression of fires, there would be an increase in the instances where livestock would be excluded from burned areas and thus an immediate negative economic impact to livestock permittees. With minimal efforts placed on fire prevention and post-fire rehabilitation, it is anticipated that there would be a greater impact to range conditions because the acreage burned as a result of wildfires, and the severity of the effect on site productivity, would increase over that of all other alternatives. Other negative effects noted for the No Action and Full Suppression alternatives would be similar to the No Action alternative, although the effects would be hastened and more devastating. This would result in the worst economic impacts to the livestock permittees.

**Cumulative Impacts** – The cumulative impacts would be similar to those described under the No Action and Full Suppression alternatives, although all effects would occur sooner under the Limited Suppression alternative.



#### 4. Proposed Action

In most instances where wild fires have occurred, the burned areas would be temporarily unavailable for grazing in order to allow vegetation to recover. Post-burn closure of an area to livestock grazing could affect the permittee's ability to use forage allocated through their grazing permits. The length of the post-burn resting period would be dependent upon the severity of the burn and the resource objectives in the areas. This may cause a short-term economic impact to the livestock permittee(s) due to the temporary closure of the allotment or portion of an allotment. Table 4T-1 shows the amount of livestock forage in Animal Unit Months (AUMs) temporarily suspended due to wildfires that occurred in 2001.

<b>Table 4T-1</b> <b>August 2001 Fire Complex Allotments and Operators by Fires</b>					
<b>Allotment</b>	<b>Public Acres Burned</b>	<b>Private Acres Burned</b>	<b>Total Private and Public Acres Burned</b>	<b>Total Private and Public Acres in Allotment</b>	<b>% of Allotment Burned</b>
Indian Springs	338.6	641.9	980.6	34,083	2.8%
Pine Mountain	93.5	126.8	220.4	63,821	<1%
Squaw Valley	12,361.8	2,820.1	15,181.9	273,823	5.5%
Midas	181	244.8	426	6,910	6%
Spanish Ranch	4,053.5	1,343.3	5,396.9	189,699	2.8%
Private	41.9	140.6	182.5	N/A	N/A
Twenty-Five	7,706	3,448.1	11,154.1	523,292	2%
Hadley	27.1	375.2	402.3	96,089	<1%
Tuscarora	23.9	22.6	46.5	97,731	<1%
Twenty-Five	316.2	0	316.2	523,292	<1%
Little Goose Creek	4,476.2	0	4,476.2	72,947	6%
Gamble Ind.	4,334.8	0	4,334.8	330,468	1.3%
Bluff Creek	12.6	0	12.6	58,319	<1%
Private	661	9061	9,722	N/A	N/A
Squaw Valley	3,9614	270.7	39,884.7	273,823	14.5%
Twenty-Five	28,716.8	2,306.9	31,023.7	523,292	5.9%
Big Springs	572.9	4.8	577.7	473,713	<1%
Boulder Field	666.7	678.9	1,345.6	11,900	11.3%
Twenty-Five	2,040.1	2,143.9	4,183.6	523,292	<1%



<b>Table 4T-1</b> <b>August 2001 Fire Complex Allotments and Operators by Fires</b>					
<b>Allotment</b>	<b>Public Acres Burned</b>	<b>Private Acres Burned</b>	<b>Total Private and Public Acres Burned</b>	<b>Total Private and Public Acres in Allotment</b>	<b>% of Allotment Burned</b>
Twenty-Five	42,356	41,316	83,673	523,292	16%
Devil's Gate	4,113.3	188.8	4302.1	68034.4	6%
Stag Mountain	1,847.3	47.01	1894.4	40376.9	4.6%
Deeth	13,382.1	0	13382.1	141429	9.4%
Black Butte	3,493.9	2,174.6	5668.5	61772	9%
HD	9.3	1,326.7	1336	379763	<1%
Little Humboldt	2,217.1	137.9	2355	84817.2	2.7%
Jakes Creek	8,856.6	4,451.9	13308.5	61358.9	21.7%
Bullhead	969.2	1,202.7	2171.9	N/A	N/A
Osgood	383.7	726.1	1109.8	N/A	N/A
Osgood	383.7	726.1	1109.8	N/A	N/A
T. Lazy S.	71.9	0	71.9	175,747	<1%

NOTE: Acres were calculated by GIS. Allotments and operators may have been affected by more than one fire.

Appropriate post fire management of burned areas is critical to successful re-establishment of healthy perennial plant communities. Typically, specific objectives for each fire or portions of the burned area(s) (i.e. grazing allotments) are developed to ensure attainment of the primary goal of watershed stabilization and preventing establishment of invasive plant species or noxious weeds. In many areas, the rehabilitation of burned areas will involve a natural revegetation response or a release of those plant species burned but not affected by the fire. In some areas, reseeding is necessary to meet resource objectives and provide for watershed stabilization. In either case, livestock grazing will need to be deferred to allow for plant regrowth and reestablishment. In many cases, it could take two growing seasons following the burn or reseeding for plant species to become established enough to withstand the impacts of grazing and still provide necessary watershed protection. However, because of the inherent variability in soils and site potentials within large burned areas and uncontrolled climatic influences, site specific monitoring will determine just when resource objectives have been achieved on specific burned areas. Annual site specific monitoring could show that grazing may occur sooner than two growing seasons or that longer deferment is needed. These determinations are made on a case by case basis based on sound resource data, scientific principles, and experience. In those areas where cheatgrass invasion is a concern, a post fire grazing plan could include short duration early spring grazing as a tool to prevent cheatgrass establishment or production, therefore, reducing competition with perennial grasses for available moisture. However, such grazing strategies must take into consideration the phenological needs of existing perennial plant species. Because livestock grazing is administered by individual grazing allotments, the



post fire grazing management for each allotment within a burned area is developed, monitored, and evaluated on a case by case basis consistent with site specific resource management objectives.

There is the potential for an increased forage base from fire or other treatments. It is anticipated that the Proposed Action would increase plant species diversity, plant composition, and forage production for livestock and wildlife. The integrated approach to fire management is expected to improve the vegetation communities throughout the District, and regain an ecological balance in areas where the long-term suppression of fires has led to unfavorable vegetative conditions. This large-scale effect outside of allotment areas would indirectly benefit livestock by improving area conditions that are at risk for devastating wildfires that could sweep through allotments at unfavorable times. A decrease in fire occurrence and size would reduce the potential impacts to livestock operations by reducing the loss of livestock forage.

Initially after a fire, livestock forage would be temporarily lost and site rehabilitation will be an important step in the recovery of many areas. Over time the need for rehabilitation may be minimized as fire management reduces the size and frequency of fires. Wherever rehabilitation measures are applied, however, there is the potential to impact range management conditions if the rehabilitation of burned areas is not successful. This potentially impact would be minimized through the application of fire prescriptions and suppression strategies that are appropriate to the site, thereby better assuring the post-fire rehabilitation success.

Impacts to livestock grazing from the implementation of fire prevention treatments may be lessened through consultation and coordination with the livestock operator. In some cases, treatments can be timed to coincide with existing grazing schedules (i.e. during the fall prior to a scheduled rest or deferred grazing year) or adjustment can be planned to allow for successful treatments with minimal impact to livestock operators.

Another potential benefit to livestock would be the use of grazing as an alternative fuels treatment measure in the creation or maintenance of greenstrips. Using grazing as a pre-treatment technique for cheatgrass control or to reduce fuel levels within wide blocks or strips of land may provide a benefit for ranchers. The use of grazing as a fuels management tool would be based on site specific objectives and evaluated against other alternative methods of achieving stated resource objectives.

**Cumulative Impacts** – Appropriate pre and post fire grazing management strategies coupled with rangeland developments and an integrated approach to fire management is expected to increase vegetative diversity and production, leading to better future rangeland conditions and increased forage availability for livestock and wildlife. The Proposed Action would result in a decrease in large fire occurrence and coincide well with existing land use plan objectives to manage for healthy sustainable rangelands. The Proposed Action will also facilitate successful implementation of local sagebrush conservation planning and the Great Basin Restoration Initiative.



## U. Socioeconomic Conditions

### 1. No Action Alternative

Initially there would be fewer instances of wildlife disruption from burned areas, leading to better hunting and recreational opportunities. Over time, there could be impacts to wildlife diversity as larger fires disrupt larger acreages of wildlife habitat and as diversity within the habitat declines. This could reduce hunting and other recreational opportunities. The potential for increased economic benefits resulting from the use of prescribed fire, where appropriate management response is implemented, would not be realized.

**Cumulative Impacts** – Past, present and future suppression efforts would lead to higher fuel loadings and more severe wildfires. Therefore, there is a potential for long-term cumulative impacts to the ecotourism economy if wildlife habitat, water quality, and the visual aesthetics of the landscape degrade as a result of fire suppression or severe wildfire. Moreover, wildfire rehabilitation costs would increase as larger areas would require more monies to stabilize the watersheds damaged by severe wildfires.

### 2. Full Suppression Alternative

Due to the emphasis on suppression, there could be greater impacts to wildlife as larger fires disrupt larger acreages of habitat and as diversity within the habitat declines. This could further reduce hunting and other recreational opportunities. The potential for increased economic benefits resulting from the use of prescribed fire, where appropriate management response is implemented, would not be realized.

**Cumulative Impacts** – The cumulative impacts would be similar to those noted for the No Action alternative.

### 3. Limited Suppression Alternative

Initially the instances of wildlife disruption from burned areas and the effects on hunting and recreational opportunities would increase. Given the low levels of activity proposed for fire prevention, response, and rehabilitation and the resultant increase in wildfire frequency and size, negative effects on all recreational activities would increase as the viability of vegetation communities decreases and the effects of erosion increase.

**Cumulative Impacts** – The low levels of activity proposed for fire prevention, response, and rehabilitation would lead to an immediate degradation to many areas that currently benefit from a ecotourism economy. There is a high potential for long-term cumulative impacts to the ecotourism economy as wildlife habitat, water quality, and the visual aesthetics of the landscape continue to degrade as a result of poor fire management.

### 4. Proposed Action

The increased vegetative diversity resulting from fires could have a positive impact on big game and upland bird species, increasing the hunter days spent within the Elko District. Bird-watching, hiking, photography, camping, and other dispersed recreational activities could increase as new vegetative diversity improved opportunities for non-game wildlife pursuits as well as the visual attractiveness of an area. The potential for



increased economic benefits resulting from the use of prescribed fire, where appropriate management response is implemented, would be realized. Though these sectors represent only a small share of the economy, some benefits would occur. Impacts relating to grazing are described in Section T.

**Cumulative Impacts** – Hunting and recreational incomes may increase as the vegetative diversity would lead to an increase in big game, upland bird, and non-game habitat quality and quantity. This could increase the hunter and visitor days spent within the Elko District. Future visitors pursuing white-water rafting, fishing and other water-based activities would benefit as the integrated approach to fire management is expected to prevent large-scale wildfires that lead to destructive rates of erosion, sediment loading, and scarring of the landscape.

## V. Evaluation and Monitoring

Monitoring and evaluation provisions of the Elko and Wells RMPs would extend to the FMA. Monitoring includes not only provisions for tracking progress toward meeting resource objectives but monitoring the implementation of the FMA itself. Completion of actions in support of plan objectives will be tracked and documented to insure conformance with the overall scope and extent of the FMA. Site specific and district-wide indicators for fire prevention, fire suppression and fire rehabilitation efforts should be monitored. District-wide indicators would have to be monitored over long-periods of time in order to determine success and ancillary factors such as weather patterns would have to be accounted for.

To ensure adequate monitoring activities, a yearly fire season report will be developed documenting how much area burned and where it burned, allotment openings and closures resulting from fire, rehabilitation efforts, and other activities. General indicators such as those found in Table 4V-1 should be included in the report.

Table 4V-1 General Indicator Table				
Activity	2000	2001	2002	2003 Acres
Fire Prevention – Acres of Treatment	<10,000	<10,000		
Fire Suppression -Burned Acreage	383,032	252,067		
Fire Rehabilitation – Acres of Rehabilitation	155,000	145,000		

Monitoring activities include plan maintenance. Since the District cannot predict future weather and fire patterns, periodic maintenance and adjustment will be necessary. This involves incorporating new information, refining strategies and updating FMC and polygons delineations. In addition, implementation of the FMA would be evaluated as part of the evaluation for the Elko and Wells RMP's.

